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**Export activity and risk reduction. An empirical
analysis of Spanish industrial SMEs during an
eco-nomic crisis**

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Date: 13.06.2017

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Foreword

This thesis is written as completion to the PhD in Business and Economics, at the Autonomous University of Madrid.

Since September 2013 I have been conducting research on the present topic. I have experienced this period as very interesting and instructive.

The subject of this thesis is an empirical analysis of Spanish industrial SMEs during an economic crisis, in order to analyze the influence of the export activity on firm's risk.

I have been able to achieve a result I am very satisfied with.

Acknowledgements

This doctoral thesis has been completed thanks to many different persons which contributed with suggestions, thoughts, and constructive criticisms. I could not have succeeded without the direction and support of those different individuals. I take thus the occasion to briefly mention them in the present section.

I would like to thank especially my first supervisor Fernando Úbeda Mellina from the department of Finance and Commercial Investigation at the Autonomous University in Madrid, who read my numerous revisions and helped make some sense of the confusion. His valuable insights and directions gave me needful guidance to complete the research and write this thesis. Fernando has guided me during the whole researches. He has been a very available and patient supervisor.

I am also grateful to my co-director Francisco Javier Forcadell for his time, valuable input and support. His theoretical knowledge and constant support helped me proceed throughout my thesis.

My thanks to all members of the jury of the thesis dissertation.

Thanks very much to Marko Baric for the support and cooperation during my whole studies. Without his assistance, it would not have been possible to complete my whole studies and finally the PhD thesis in such a successful way.

Last but not least, thanks a lot to my family, for always supporting me during my studies at home and abroad. They gave me the required support to complete my whole studies and finally the thesis.

Sasa Aleksic

Madrid, June 2017

Abstract

The current work analyses the effect of internationalization on firm performance and risk. In detail, it uses insights derived from real options theory to investigate how under the uncertainty caused by the financial and economic European crises, SME's exporting infrastructure provide strategic flexibility that facilitates an immediate response to downside risks, which in detail is the risk of making a loss from a specific investment. Thus, in the present work the effect of export, export diversification and operative flexibility on firm's risk is analyzed by implementing a linear and a non-linear regression of firm performance to a measure of diversification and a set of control variables.

Referring to this, the analysis examines the effect by using a sample of 1.713 manufacturing Spanish firms with at least 20 employees and fewer than 250 employees. The data is received from the study, called "Encuesta Sobre Estrategias Empresariales" (ESEE) for the period between 2007-2011. The Difference -In-Difference analysis and Heckman's two-stage method is used by implamanting a non-linear regression to perform the analysis. Furthermore, a quasi experimental methodology is applied to avoid the risk definition.

The results indicate that internationalization permit to mitigate the negative effects of a significant change within firm's environment. In detail, during the period between 2007 and 2011, non-exporting SMEs experienced a higher productivity loss than exporting SMEs. Thus, the negative effect of the crisis on performance has a lower intensity on exporting firms than on domestic firms. This conclusion confirms that internationalization reduces risk, or in detail that the export activity reduces SMEs risk.

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List of abbreviations

AI	advertising intensity
ALL	all firms
CRV	cluster robust variance estimator
DID	Difference-In-Difference
DOI	degree of internationalization
EI	export intensity
EMU	European Monetary Union
EMV	excess market value
ESEE	Encuesta Sobre Estrategias Empresariales
ESTS	export sales as a percentage of total sales
etc.	et cetera (and other things)
Exp	exportation
e.g.	exempli gratia (for example)
FATA	foreign assets over total assets
FDI	foreign direct investment
FPTP	foreign profits as a percentage of total profit
f.	following
GDP	gross domestic product
GMM	generalized method of moments
GTFP	growth rate of total factor productivity

IMR	Inverse of Mill's Ratio
IPROC	inovacion en proceso (Process innovation)
IPROD	inovacion en producto (Product innovation)
LM	Lagrange Multiplier
MNEs	multinational enterprises
NACE	Statistical classification of economic activities in the European Community
OLS	ordinary least squares
OR	non-exporting firms and firms that export with own resources
OSTS	overseas subsidiaries as a percentage of total subsidiaries
PDIO	psychic dispersion of the international operations of a firm
RBV	resource-based view
RDI	research and development intensity
ROA	return on assets
ROS	return on sales
ROE	return on equity
ROTA	return on total assets
R&D	research and development
SMEs	small-and medium-sized enterprises
TFP	total factor productivity
TMIE	Top managers international experience

VIF	variance inflation factor
WOR	non-exporting firms and firms that export with external facilities (without own resources)

1 Introduction

Does the internationalization¹ in form of exportation lead to improved performance by reducing SME's² risk? This question is the focus of the following scientific work. In detail, this study concentrates on and explores the impacts of exporting activities as a dampening element of the effects, a financial and demand crisis produces.

However, the question regarding internationalization's impact on performance and risk has already been one of the central issues in the international business literature and the subject of several studies (Santalo and Becerra, 2008). Referring to this, internationalization can be named as one of the paths for firm growth. Due to the importance of this issue, many works dealing with this topic already exist. Even though, a broad range of internationalization-performance and internationalization-risk literature in general already exist, literature especially in crisis periods is limited (Lee and Makhija, 2009; Song, 2009). In addition, the majority of the internationalization-performance and -risk research has been primarily interested in exploring large MNEs. Only a small amount of studies concentrating on SMEs does exist (e.g. Chiao et al. 2006; Lu and Beamish, 2001; Pangarkar, 2008; Qian, 2002).

By observing the present literature in the field of interest, it results that firms are facing a dilemma. On the one hand, internationalization provides firms with different opportunities which have the ability to result in better performance and reduced risk. On the other hand, internationalization exposes firms to heightened risks, which may negatively influence firm's performance and risk. Consequently, Reuer and Tong (2007) claim that internationalization is a predominantly important growth strategy for firms whose business scope has been geographically limited. Beside the goal of achieving firm growth, the improvement of firm profitability and performance is one of the most current goals attributed to internationalization (McDougall and Oviatt, 1996).

¹ Throughout this scientific work, the term internationalization refers to the process of entry and expansion in foreign markets. Different authors are using the term geographic diversification, geographic expansion or international diversification in the same context. Thus, internationalization will be used as a synonym for geographic diversification, geographic expansion and international diversification. In chapter 2.1.1 the diversification term is explained further.

² In the present scientific work and in the literature, the term of SMEs is differentiated from MNEs. A frequently used definition in the literature is that SMEs are firms with fewer than 250 employees. This is a commonly used definition which will be applied as well in the present work (OECD, 2005).

However, empirical studies on firm internationalization show that internationalized firms are facing not only additional benefits but also costs, compared to non-internationalized firms. For the measurement of the mentioned internationalization's impact on performance and risk, different methods and variables were used in previous researches. But, the literature is hampered by issues regarding the measure for the key dependent variables such as risk, performance and firm value, but also by issues regarding the measurement for the independent variables as degree of internationalization and dispersion. Building on this fact, the researchers conclude contradicted results. Some researchers conclude a positive effect of internationalization on firm performance and risk, while others conclude no effect or a negative effect and again others found curvilinear relationships. Giving the fact that previous research has inconclusive results, the intention is to clarify a tendency or rather to determine the dependent factors, which influence the results. This clarification and determination of the dependent factors should serve as a base to modify previous results and to make a significant contribution to current science and practice.

Given the fact that positive as well as negative outcomes exist, curvilinear relationships may be possible as well. Researcher as Hitt et al. (1997), Thomas and Eden (2004) or Lu and Beamish (2004) found such relationships in the internationalization-performance research. Consequently, the present work deals with this issue and analyses if non-linear relations occur, as well.

It can be concluded that numerous different studies and researches regarding the general analysis of the relation between internationalization and performance and a large number of studies regarding the internationalization-risk relationship do exist. Nevertheless, some related issues have received less attention. Hence, empirical evidence regarding real options in internationalization decisions, which generate operative flexibility, is rare. Existent research is generally focused on the analysis of MNEs. It is consequently of interest to use SMEs and to focus on exportation rather than on FDI (Lee and Makhija, 2009). In detail, this doctoral thesis is focused to analyze and detect specific factors that determine the relation between exportation and risk for SMEs.

A further gap is identified in the selection of performance measurement and variables. While the relationship between internationalization and performance has been researched extensively in previous studies, little effort has been expended to analyze the effect of internationaliza-

tion on firm risk. In this regard, Hsieh et al. (2010) define risk as instabilities and vulnerabilities of firms that engaged in internationalization and which impose limitations, restrictions and/or losses. Since the risk can impact the firm negatively, firms engage increasingly efforts regard their risk management.

Even though more evidence exists in the internationalization-performance research, studies which provide evidence in the mentioned research field of internationalization and risk are present as well. Similar to empirical research which examines the relationship between internationalization and performance, the mentioned studies have also achieved contradictory results. While different authors as Miller and Reuer (1998) as well as Reuer and Leiblein (2000) report that internationalization increase firm's risk, other researchers as Allen and Pantzalis (1996) as well as Lee et al. (2006) found that risk is negatively related to the degree of internationalization. However, especially for SMEs, capacity in the internationalization-risk relationship analysis still exists. Miller and Reuer (1998) as well as Wagner (2012) claim that the export activity can provide firms with opportunities and is able to substitute sales in the domestic market by sales in foreign markets, especially when the domestic market is impacted by a negative demand shock. To this end, the first hypothesis is justified which indicates that the export activity in general reduces firm's risk.

The first explanation for risk reduction is placed in the second hypothesis and named as the diversification effect. This effect proposes that a higher international diversity diminishes more the risk. Differences in the export-risk relationship consequently exist when using different geographic diversification degrees (Thomas, 2006; Pangarkar, 2008).

The second reason for the risk reduction capacity is the operative flexibility effect. It proposes that the export activity is generating operative flexibility through enhanced upside potential and limited downside risk. Recent theoretical advances suggest that real options theory potentially offers a powerful valuation tool as well as a systematic strategy framework to evaluate and structure resource investments under uncertainty. It offers valuable switching as well as growth opportunities, a firm can exploit. The successful use of these switching and growth options can enhance the operational flexibility and deductive leads to benefits of downside risk reduction and/or up-side potential improvement (Tong and Reuer, 2007; Belderbos et al., 2014). The value of operative flexibility depends on contextual uncertainty. The higher the uncertainty, the higher the value of operative flexibility (Broll and Eckwert, 1999; Lee and

Makhija, 2009). It seems therefore logical to analyze the effects of operative flexibility in the context of an unanticipated yet significant economic downturn, such as an economic crisis. Moreover, research that apply such a context to investigate international flexibility for export SMEs, do not exist (Lee and Makhija, 2009; Miller and Reuer, 1996). The real option embedded in the operative flexibility effect is consequently the second explanation, beyond the diversification effect, of the exporting-risk relationship and consequently the third hypothesis.

A further issue to analyze in the given framework is the entry mode. Different researchers already have discussed and analyzed the international entry mode selection (e.g. Burgel and Murray, 2000; Zacharakis, 1997; Jones, 1999; Nakos and Brouthers, 2002; Brouthers and Nakos, 2004; Decker and Zhao, 2004; Laufs and Schwens, 2014). The existing literature related to entry mode choice primarily concerns MNEs, whereby the activities of SMEs, which in general belong to export, have been analyzed less (Nakos and Brouthers, 2002; Decker and Zhao, 2004). In addition, only limited empirical evidence exist on how entry mode choice is influencing post-entry decisions as well as performance and risk (Brouthers and Bamossy, 2006; Canabal and White, 2008). The following work will also contribute to this stream of literature. Thus, the level of resource commitment in the export mode is a moderating variable of exporting-risk relationship. It refers to the entry mode that firms are using in the internationalization process and works as a knowledge generator that improves the hedging strategy and therefore reduces the risk (hypothesis 4).

An important issue in real options theory is the treatment of uncertainty. This is because real options theory was employed to examine the decision-making in firm's uncertain environments (König, 2009). The risk definitions in uncertain environments will be avoided by using a quasi experiment. In order to realize the pseudo-experiment, three conditions are settled, which are based on Lee and Makhija (2009). First, a good-sized sample of firms is needed that differ in their structure of international investments. Second, a definable moment is obligatory when the rate of change shifts in an adverse direction. This condition allows a comparison of different periods which reflect economic stability and economic turbulences. The third condition is a measurable ex-post performance outcome for the differing ex-ante strategies. If investments in internationalization support firms to exercise flexibility, the flexibility would be associated with higher firm value under such conditions. This in turn allows to outperform other firms without the mentioned investments (Lee and Makhija, 2009). Regarding

to this, the present empirical work analyzes the difference in performance between export and non-export SMEs under specific conditions of unanticipated environmental downturn

The European financial, economic and sovereign debt crises between 2007 and 2011 is an appropriate crisis to use for the analysis. This economic downturn has left substantial fiscal burden for the governments of several EMU-countries. Since the start of the global financial crisis 2007, government debt to GDP ratios have increased sharply in all countries of the EMU. Beyond the governments, firms have been affected as well. In this regard, most affected by the sovereign debt crises were the countries from the EMU periphery, thereunder Spain (Lojsch et. al, 2011). Despite their dismal impact on business, little is known about how SMEs respond effectively to financial crises. Hence, the economic crisis offers the possibility to evaluate the issue, if the internationalization in form of exports leads to an improvement of firm performance and risk in a crisis period. The mentioned crisis will serve in this framework as a pseudo-experiment. The fulfillment of the hypothesis, that internationalization reduces firm's risk, would signify that the effect, the crisis had on performance of exporting firms, would have a lower intensity than on domestic firms without export activity. Since Spain has been one of the most affected countries by the crisis, the realized analysis is based on Spanish firms. Consequently, the focus is to analyze if internationalization leads to improved performance and risk reduction of Spanish SMEs.

In order to perform the mentioned analysis, different methods, methodologies, variables and samples can be used. In line with the analysis of Melitz (2003), the exporting activity incorporates sunk costs which arise once the firm decides to export and which only can be covered from the most productive ones. This assumption introduces a selection bias which has been contrasted by the available evidence (Eaton et al., 2004). It is determined by the mentioned evidence, whether the group of firms can be compared with a group of non-exporting firms or not. The possible differences in productivity can be explained due to the export activity or due to the individual productivity inertia. With the objective to control for endogeneity, a treatment and a control group were created. In this regard, the method of Difference-In-Difference will be used. This methodological approach is used to compare productivity growth between the two mentioned types of firms, during the years of crisis between 2007 and 2011. In addition, the thresholds regression approach will be included to test for non-linearity. When using the Difference-In-Difference method, the potential problem of serial correlation can occur. To solve the mentioned problem, the bootstrap method for cluster-robust inference in quantile

regression models is developed. Consequently, the cluster jack-knife method estimation and Wild Cluster Bootstrap which is proposed by Webb (2013) are used to estimate the significance levels of coefficients.

The arguments are tested empirically by using the data from a longitudinal study of Spanish manufacturing firms, called “Encuesta Sobre Estrategias Empresariales” (ESEE). The sample of firms includes Spanish manufacturing firms with more than 20 and less than 250 employees. The sample attempts to maintain the representativeness of the manufacturing sector over time. The sample of data chosen from the ESEE dataset provides an adequate setting to analyze the relationship between internationalization and performance as well as risk of firms (Cassiman and Golovko, 2011; Manjon et al., 2013). In order to undertake the present analysis, a sample of 1.713 manufacturing Spanish firms has been selected. 947 firms have exported during the observed period between 2007 and 2011, whereby 766 did not demonstrate any exporting activity during this period.

As a result, the empirical findings confirm the claimed hypotheses and support the central thesis that the internationalization through the export activity reduces firm’s risk. Especially in crisis periods, exporting firms are enabled with a better performance than non-exporting firms. This is the first confirmed hypothesis and the effect is named as the export effect.

The second hypothesis, that export diversification reduces strategic risk, is analyzed by implanting a threshold model. The performance and risk can be analyzed in relation to different diversification level. The present work analyses consequently if non-linear relations occur. In detail, it will be tested at which quantile the internationalization-risk relationship changes for Spanish firms and therefore at which percentage of firm’s sales abroad, the performance and therefore the risk changes. Different thresholds are identified at the 0.21 and the 0.69 level. Consequently, the internationalization-risk relationship is dissimilar for Spanish firms having up to 69 % of their sales abroad in contrast to Spanish firm having 21% of their sales abroad (Hansen, 1996; 2000). It is proved and designated that the diversification effect is one explanation for the export effect. Thus, firm’s performance and risk depends on the diversification level.

A further explanation for the export effect is the real options effect. The findings from these studies suggest also that the operational flexibility generated through the export activity reduces strategic risk. Thus, hypothesis 3 can be confirmed completely.

Finally, hypothesis 4 is confirmed, as well. The mentioned hypothesis demonstrates the export mode effect. This signifies a reduction of strategic risk through resource commitment in export activity. Firms exporting with own resources have consequently the ability to reduce further the risk in comparison to firms exporting without own resources.

In sum, since the results of prior research have been inconsistent and such research including the export-risk relationship of SMEs during the European economic crisis has never existed, the present research fills a gap in the existing literature on the topic of internationalization-performance analysis.

In conclusion, the present research investigates the downside risk implications of international investments in form of internationalization. Specifically, the research emphasizes the need to examine real options more closely and to incorporate more explicitly operative flexibility that may facilitate or obstruct firm's implementation of real options.

A summary of the main findings and the principal issues and suggestions which have arisen in the internationalization -performance and -risk discussion has been provided and introduced in the previous two sections. The following section describes the structure and the further flow of the thesis. Thus, the scientific work proceeds as follows: in chapter 2, an overview of the main literature dealing with the key theoretical concepts is given. Section 2.2 gives an overview of the internationalization literature. First, geographic diversification will be explained including foreign direct investment (FDI) and export. In this regard, the difference between geographic and industrial diversification is clarified. This overview includes the benefits as well as the costs of internationalized firms. Since the present work gives special attention to exporting firms, an overview of exportation as one alternative of internationalization is given, including the benefits and costs as well as the separation to FDI. The scientific work proceeds with the results of prior researchers. In this regard, previous results of exportation's impact on firm performance are presented.

Section 2.3 includes a broad overview of the relationship between internationalization and risk. Referring to this, two different effects of the exporting activity on risk are existent and analyzed. The first is the effect of export activity on risk diversification, which is the natural risk coverage. The second is the effect of exporting activity on operative flexibility, which is named as the operational flexibility. The two effects are able to reduce the risk. To conclude

this section, two hypotheses are implemented, based on the two effects that are able to reduce the risk.

The literature review proceeds in section 2.4 with the operative flexibility and the export mode. First, the internationalization process and the foreign market entry mode will be explained, because the choice of entry mode affects the performance as well as the risk. Then the generation of international knowledge is analyzed. In literature, it is known as the “Learning by exporting” hypothesis. The mentioned hypothesis claims that the exporting activity generates different capacities as knowledge about international markets. This in turn has also significant performance and risk implications on firms. The resource commitment is a further important aspect in this section. Thus, with the establishment of an exporting infrastructure, firms are able to use direct as well as indirect methods. This resource commitment, the related learning as well as benefits and costs are also explained in this part. The section concludes in 2.4.3 with the explanation of the creation of international knowledge and operative flexibility.

In order to understand the present empirical work, section 2.5 explains and outlines the theoretical framework and gives a conclusion of the literature, necessary for the current analysis.

In chapter 3, the methodology and empirical techniques and methods for the measurement of the analysis are explained. For this, an overview and the description of empirical measurement and methodology used in previous studies as well as in the present study is given. Following on from this in section 3.1 the utilization of a pseudo-experiment is explained, which is the economic crisis. Section 3.2 proceeds with the description of the sample and data used in the empirical part. In order to give an adequate overview, section 3.3 describes the geographic diversification variables. First, the dependent variables which are the performance variables are analyzed. The central performance measures in this work is total factor productivity (TFP) estimated at firm level as well as growth in total factor productivity (GTFP). After describing the internationalization variables in section 3.3.3, the control variables are shown finally, which ensure control for unobserved heterogeneity.

Section 3.4 continues with the econometric specification. First, the Difference-In-Difference analysis will be used, to make a causal inference on the productivity effect of exporting for Spanish SMEs. In detail, differences in performance between the exporting and non-exporting firms will be analyzed prior but also after the economic crisis. 2009 will be used as the reference year because this year had the highest impact on the Spanish economy. In section 3.4.2,

the Heckman procedure is used to control for endogeneity. In internationalization - performance and -risk relationship curvilinear relationships may exist. Due to this, the Difference-In-Difference regression approach will be extended by implanting a threshold model, to implement a non-linear regression. The subsequent section tackles the problem of cluster-robust inference which is also named as the autocorrelation problem. It solves the potential problem of serial correlation. To conclude the third chapter, the problem of collinearity is covered. This problem refers to the existence of a perfect linear relationship among exactly two independent variables of a regression model.

Chapter 4 illustrates and examines the obtained results of the analysis. Then, the final chapter 5 summarizes the whole work. The final intention in this chapter is to give a conclusive answer regarding the research question with implications for further research.

2 Literature revue and hypotheses

2.1 Introduction

This chapter contains a review of the existent literature on firm internationalization. First, a general literature review of firm internationalization is given. Section 2.2.1 serves to distinguish between international and product diversification. Thus, the mentioned section gives a general introduction in internationalization by explaining the diversification term. After the clarification of the internationalization term, the benefits and costs which are accompanied by the internationalization are discussed. In this regard, the effect of multinationalization also named as FDI is separately illustrated to the effects of exportation, which refers especially on SMEs. This is due to the fact that the majority of studies that have examined the internationalization-performance relationship have focused on large and multinational firms and not necessarily on SMEs and exportation. In order to give an entire overview about previous literature, it is consequently necessary to observe the present literature focused on SMEs, but to also take into consideration the literature focused on MNEs. Section 2.2 finishes by showing the different empirical results of the internationalization-performance relationship with their resulting inconsistencies in the generated results.

Whereas the purpose of the present work is analyzing the systematic risk in internationalization choices, Section 2.3 gives a literature review of internationalization and risk. First, the effect of export activity and the benefits of reduced strategic risk are explained which is named as the export effect in the following work. Section 2.3.1 ends with the setting of the first hypothesis.

Section 2.3.2 continues with the explanation of the export diversity on strategic risk. It will be clarified if more diversified firms in terms of exporting to a higher number of foreign countries as well as to countries with a higher psychological distance are in general enabled with better performance outcomes than firms exporting to a smaller number of foreign countries and to countries with a smaller psychological distance. The presumed reduction of strategic risk through export diversity is named as the diversification effect. The second hypothesis is placed in this part of literature review.

The chapter continues with real option theory in international investment choices. In detail, it contains the flexibility generated through international investments in real options theory. It

will be clarified, why internationalization generates such flexibility. Furthermore, the disposable evidence regarding the impact of internationalization on operative flexibility will be shown.

The uncertainty face by firms increases by undertaking international investments. In this regard, the crisis can be named as one type of uncertainty. In section 2.3.3, different types of real options will be defined in an international business context. By analyzing the causes and consequences of an investment under high uncertainty, the real options logic has become consequently an important theoretical tool. The improved uncertainty increases the need for real options, because the benefits consist of enhanced upside potentials and the limitation of downside risk Song et al. (2015). Thus, the present section focuses on strategic investment decisions of firms by using the real options theory and how the presence of these options may affect the performance and risk under uncertainty and other environmental conditions. The section also deals with operative flexibility generated through export activity. The leading effect of reduced strategic risk through the mentioned operative flexibility is named as the real option effect. The setting of the third hypotheses finishes this section.

Section 2.4 deals with the subject of operative flexibility and export mode. It starts with the inclusion of export development models. In this stream of literature, it is important to reflect the internationalization process, entry mode choices and the learning by exporting aspect which indicates, that exporting generates knowledge about international markets. It has to be distinguished between a direct and indirect establishment of an exporting infrastructure and also the required resource commitment of the different entry modes. It is claimed that resource commitment in export activity is able to reduce the strategic risk because it provides experiential learning and reduces the level of internal uncertainty (Johanson and Vahlne 1977; Figueira de Lemos et al., 2010). The mentioned effect is named as the export mode effect. At this point, the fourth and final hypothesis is implemented.

Section 2.5 is the final section of the second chapter which summarizes and concludes the theoretical implication of the entire work. It illustrates and describes the framework for the analysis of export and risk. It follows a conceptual framework including the research hypothesis. This framework is described and drafted to give a better understanding of the whole work and to give an entire overview of the path and the goal of the present research.

2.2 Firm internationalization: A literature overview

In order to introduce the existing theoretical and empirical work, it is necessary to clarify exactly the term of diversification and especially of geographic diversification. Thus, section 2.2.1 defines the term of geographic diversification or rather internationalization and isolates it from the term of product diversification. After defining the term, it is important to clarify the benefits and costs of the mentioned internationalization: first the benefits and costs of FDI; then the benefits and costs of the exporting activity are shown. Finally, it seems necessary to oppose the mentioned benefits to the costs in order to analyze the effect of internationalization on performance. Empirical results regarding the internationalization and performance are mixed and far from conclusive.

2.2.1 Diversification strategies

Upcoming from the 1950s in the USA, the term “diversification” found its way into the economic terminology, as an entrepreneurial strategy for the regular enlargement of a firm’s previous scope of activities. Since the 1950s until today, the issue of diversification has become one of the most important fields of research within the strategic management and business literature. To this end, a broad range of various definitions, measures and systematizations with regard to the terminus of diversification does exist. Different authors also speak about a terminological confusion. For this purpose, it is essential to systematize and define the term of diversification *ex ante*, in order to set a clear terminological framework for the subsequent analysis.

Thus, the mentioned term of diversification is characterizing a status that a firm holds as well as a process which a firm pass through. A firm diversifies if it joins onto new business-segments or new segments of activity. On the other hand, it is already diversified by currently operating in different business-segments, respectively segments of activity (Schüle, 1992).

A firm has various possibilities to diversify, whereby the segments of activity are realized mainly with products and/or markets. In this regard, one alternative of diversification is the geographic diversification, also called internationalization. The geographic diversification strategy will be seen as the entrance of a firm into a new market or markets beyond national

borders. Thus, a firm can be called geographically diversified if it operates in different countries (Gort, 1962). Apart from this alternative, a firm has other possibilities to grow and diversify as well. Hence, the second alternative of diversification is the product, also called product diversification. Referring to this, Andrews (1951) claims that a firm diversifies by producing and selling new products.

Ansoff (1965) combined the two different approaches of diversification using a so-called product-market-matrix, illustrated in table 1, which led to another definition of diversification. The assumption of Ansoff (1965) is, that a firm is diversified by selling new products in one or various new markets. It is thus a combination of both, the product- as well as the market-perspective of diversification. Referring to this, product and geographic diversification may, in fact, consist of several different patterns including: expanded presence in existing non-core product markets, expanded presence in existing foreign markets, entering new non-core product markets (categories) in existing geographic markets (e.g. existing countries), entering new geographic markets with existing products, and entering new countries with new noncore product categories. The distinction between these patterns is tremendously important, since each one involves a different level of departure from the firm's knowledge and resource base and implies different uncertainty and risk levels (Ansoff, 1965; Hutzschenreuter and Horstkotte, 2013).

Table 1: Product-market-matrix by Ansoff

		Product	
		Present	New
Markets	Present	Market penetration	Product development
	New	Market development	Diversification

Source: Own elaboration based on Ansoff (1957)

Moreover, the definitions of each diversification type can vary by observing different empirical studies or depending on different authors. For that reason, there is no uniform or general-

ized definition of firm diversification. There are several essential differences between diversified firms in terms of the number and heterogeneity of existing products and occupied markets. This is particularly interesting when analyzing the diversification of geographically diversified firms. This shows the need to be explicit about exactly what is meant by geographic diversification, which will be explained in the further progress of this work. Even though the focus of this work is placed on exporting as one possibility of geographic diversification, the existence of product diversification has to be mentioned for the sake of completeness. This is because the empirical analysis was carried out with SMEs, which generally have a small level of product diversification. Hence the growth strategy of product diversification can be rather related to larger companies and multinational companies. The generated benefit of isolating the product diversification from the geographic one is that product diversification involves additional difficulties such as integrating and running multiple lines of business. Product diversification can also provide additional benefits, e.g. demand synergies across products. Nevertheless, by isolating the product diversification in the present work, one is not confounded with geographic diversification when examining SMEs, because exporters generally sell similar products in domestic and foreign markets (Shaver, 2011).

The present section has clarified which type of diversification is analyzed in the current analysis and what it especially means. Thus, the term geographic diversification refers to the process of entry and expansion in foreign markets. Different authors use the term internationalization, international diversification or geographic expansion in the same context. Throughout this scientific work, the term internationalization will be used as a synonym for geographic diversification, international diversification or geographic expansion. Nevertheless, the used term has the same meaning as explained in this section and as other terms used in this stream of literature.

2.2.2 Benefits and costs of internationalization

One of the most essential paths for a firm's growth is internationalization. It is a predominantly important growth strategy for firms whose business scope has been geographically limited (Barringer and Greening, 1998). Beside the goal of achieving firm growth, the improvement of firm profitability and performance is the main outcome attributed to geographic diversifica-

tion (McDougall and Oviatt, 1996). According to this, exporting and FDI are two of the most common paths of internationalization (Lu and Beamish, 2001; 2006). Therefore, first the internationalization path of FDI will be examined. Subsequently the effect of the export decision is explained and analyzed.

2.2.2.1 Effects of multinationalization

Firms have the opportunity to grow and are able to achieve a larger volume of sales by increasing the number of returning customers through entering new markets. Nevertheless, there are wide and crucial differences between the markets, especially in market conditions across different geographic areas. Firms are in a position to capitalize on market imperfections and realize higher returns on their resources, by leveraging resources in different markets (Zahra et al., 2000). Consequently, Zahra et al. (2000) establish that in the pursuit of growth, firms will adopt an internationalization strategy for achieving new opportunities to leverage core capabilities across a broader range of markets. Further potential advantages for internationalizing firms are scale economies. Consequently, the opportunity of greater cost efficiencies mainly due to a higher volume of business and the ability to exploit economies of scale does exist (Caves, 1971). Internationalized firms could also conduct value creation activities in particular locations for minimizing their costs. One example is labor intensive activities in low-wage countries (Ghoshal, 1987; Thomas and Eden, 2004). Tax rate arbitrage is a further possible gain. By charging appropriate transfer prices to subsidiaries, taxes can be reduced (Lessard, 1979; Allen and Pantzalis, 1996; Kogut, 1985). Another benefit arises from the diversity of environments the firm operates in (Ghoshal, 1987; Rugman, 1979). Hence, the firm enjoys learning opportunities while responding to different competitors in international markets and satisfying the diverse customer needs (Kostova and Roth, 2002; Zahra et al., 2000). This benefit also leads to improved operations from facing greater competition (Porter, 1990). Thomas and Eden (2004) refer also to potential gains from exchange, which are generated by country-based differences in demand. Firms have the possibility to shift sales from low-income to high-income markets. Consequently, higher profits on firm's resources will be generated. Multinational flexibility can be seen as a further gain. Kogut (1984) argues that firms can benefit from multiple locations because it flexibly allows firms to adapt the shocks in the external environment. Further benefits for a geographically diversified firm are so ales

stabilization over time (Hirsch and Lev, 1971; Rugman, 1979), profitable transfers of innovation from one location to another (Bartlett and Ghoshal, 1991) and cheaper factors of production (Porter, 1990). As previously mentioned, high firm growth has also been associated with a relatively high percentage of revenues coming from foreign sales (Feesser and Willard, 1990).

The implementation of a strategy involving the expansion into new geographic markets not only provides benefits, but also generates challenges (i.e. costs and risks). These new challenges occur additionally to the existent ones associated with the domestic growth of firms (Barringer and Greening, 1998). The generated challenges are related with the fact that the target markets are different to the domestic markets. Such differences between host and domestic markets arise in political, economic, legal and cultural dimensions. This obliges a geographically expanding firm to change many of its methods of doing business that were developed for a domestic framework.

A geographically diversifying firm also faces foreign exchange risk due to different exchange rates between countries. According to Thomas and Eden (2004), the foreign exchange risk increases with the number of foreign countries in which the firm operates but the international diversification of markets may also protect the firm from region specific exchange rate shocks. Costs and risks also arise because of multiple levels of authority. As the firm expands into additional countries, it faces higher cross-border transaction costs and higher interaction costs with a wider variety and number of governments. Thus, the transaction costs theory claims that internationalization poses higher challenges to the management and can lead to increased coordination and communication costs (Thomas and Eden, 2004). Chase et al. (1988) observed the relevance of political risk. They point out that political risks may also increase with the progress of the geographic expansion. Further costs are given due to greater cultural diversity. With the rising, respectively development of geographic diversification and new geographic markets, the firm faces costs of adapting new and more heterogeneous cultures. Empirical research indicates that the liabilities of foreignness, thus the costs of doing business abroad that result in a competitive disadvantage for a geographically diversified firm (Zaheer, 1995), increases when firms expand to more culturally diversified countries (Gomes and Ramaswamy, 1999).

The present work deals primary with exportation and SMEs. Thus, in this present section the effect, and consequently the benefits and costs of exportation are examined, which can vary to the benefits and costs of multinationalization and thus FDI.

2.2.2.2 Effects of exporting

Many of the previously mentioned benefits such as costs and risks of internationalization refer to large, established firms. Consequently, these costs can be related rather to MNEs than to SMEs. Based on the fact that the present analysis deals with SMEs, in the following exportation as one possibility of internationalization will be presented with its effects and consequences, rather than the terminology and effects of FDI. The characteristics of exporting enable the opportunity to gain precious international experience (Erminio and Rugman, 1996; Sullivan and Bauerschmidt, 1990; Zahra et al., 1997). In addition, the applicability of the previously mentioned benefits and claims to SMEs will be analyzed.

It can be concluded that internationalization is a strategy when looking for opportunities in order to generate firm growth and wealth by expanding into new markets (Lumpkin and Dess, 1996; Zahra et al., 1999). In this regard exporting and FDI are two of the most common paths of internationalization (Lu and Beamish, 2001; 2006). This present study concentrates and explores the impacts of exporting activities on firm performance and risk, rather than FDI activities. This is because the internationalization strategy of exporting is more appropriate for SMEs because SMEs commonly lack the resources, financial or otherwise, for FDI (Dalli, 1995; Zahra et al., 1997).

Exporting can be explained as the first step of entering into international markets and it serves as a platform for future international expansions and growth like FDI (Kogut and Chang, 1996). An exporting firm does not have to deal with the difficulties and complexities of establishing a foreign subsidiary and thus it is not necessary to make a resource commitment to a foreign market as it has to do when undertaking a foreign investment (Lu and Beamish, 2006). Consequently, exporting if compared to FDI, constitutes an easier and faster internationalization strategy to implement because it involves comparatively low levels of commitment and risk. It enables SMEs relatively faster access to foreign markets with little capital investment required, because a firm can use its existing production facilities to serve its for-

eign markets. In this regard, exporting implies the production of goods at home which are sold in foreign markets. The selling proceeds directly or through export agents to clients in new geographic markets. A firm widens its consumer base and can potentially achieve a higher sales volume which in turn leads to the possibility of a higher production volume and expansion in production capacities (Lu and Beamish, 2006). Consequently, the central difference between an exporting firm and a non-exporting firm is the geographic diversity of its sales (Shaver, 2011). It can be concluded, that exports constitute the initial preferred way of internationalization for SMEs (Young et al., 1989).

Additionally, it has to be mentioned that exporting is a less risky strategy due to the flexibility of being able to withdraw from a foreign market easily, should negative fluctuating market conditions and/or political instability occur. In contrast to a multinational firm, the exporting one can easily change its geographic scope by adjusting its export volumes in different foreign markets (Lu and Beamish, 2006).

The creation of knowledge is a key benefit of internationalization which strongly depends on the entry mode. Not the whole exporting activity generates compulsively knowledge. It depends strongly on the entry mode, which will be further explained in section 2.4. Furthermore, FDI is more suitable for the contextualization of competitive advantage and thus for the creation of intangible assets. The additionally generated learning from internationalization could be useful for developing new products and technologies. SMEs are in an advantageous position to capitalize on the learning opportunities. Given the informal and centralized nature as well as the small size of their organizations, it may be relatively easier to communicate and obtain buy-in of learning. Furthermore, it may be easier to overcome some of the obstacles for leveraging and sharing the knowledge acquired (Pangarkar, 2008).

One of the most evident economic gains of an exporting firm are gains related to scale and scope economies. These gains are achieved by having larger volumes of sales and production and are enabled through revenue growth in the geographic extension of markets (Kogut 1985; Grant et al., 1988). The scale and scope economies lead to significant cost savings and contribute directly to firm profitability (Lu and Beamish, 2006). As a further gain achieved by acting in multiple and diverse international markets can be named the advantages related to increases in market power (Kim et al., 1993).

The potential economic benefits from exporting suggest that exporting activities should have a positive impact on firm profitability (Lu and Beamish, 2006). Successful internationalization might also enhance the value of the brand in the home market (Pangarkar, 2008).

Nevertheless, costs do exist as well, when establishing an exporting infrastructure. From the “new trade theory” perspective is proposed that the development of exporting activity implies to assume necessary sunk costs to create an infrastructure that allows the development of an exporting activity (Melitz, 2003). The exporting activity exposes the firm to new markets, new technologies and new organizational requirements. This implies to invest e.g. in contextual learning, the development of a distribution network. The research from Eaton and Kortum (2004, 2005) and de Roberts and Tybout (1997) shows evidence that confirms the existence of sunk costs when starting the exporting activity.

In section 2.2.2.1 and section 2.2.2.2 different benefits and costs of internationalization were presented. These benefits and costs were presented for the two different internationalization paths of FDI as well as for exportation. In order to avoid confusion and to give an adequate overview, in Table 2 the internationalization benefits and in Table 3 the internationalization claims are presented. It is obvious that the two various methods of internationalization show differences which become clear in the diversity of the individual benefits and issues. Nevertheless, different benefits can be assigned to both internationalization paths and in both cases the benefits outweigh the costs. Consequently, based on the facts and arguments in this section international investments have positive impact on growth and profitability of SMEs. Nonetheless, internationalization and their impacts on performance are explained and analyzed in section 2.2.4 and internationalization and their impacts on risk are explained in section 2.3.

In addition, referring to the mentioned costs and risks it can be concluded that the knowledge a firm has developed by operating in its domestic markets are often not appropriate for operations in new markets. To successfully enter new markets, new knowledge and capabilities need to be attained or developed (McDougall and Oviatt, 1996). This issue will be explained further in section 2.4.

Table 2: Overview of internationalization benefits

	Benefits of FDI	Benefits of Exporting
Firm growth	+	+
Improvement of firm profitability	+	+
Economies of Scale	+	+
Increased market power	+	+
Economies of Scope	+	+
Increasing of the brand value in the home market	+	+
Sales stabilization over time	+	+
Learning new knowledge	+	+
Improved operations from facing greater competition	+	+
Gains from exchange, which are generated due to country-based differences in demand	+	+
Possibility to shift sales from low-income to high-income markets. Consequently, higher profits on firm's resources will be generated	+	+
Multinational flexibility: Firms can benefit from their multiple locations because they flexibly adapt the shocks in the external environment	+	+
Capitalization on market imperfections and realization of higher returns on resources, by leveraging resources in different markets	+	-
Labor intensive activities in low-wage countries	+	-
Tax rate arbitrage	+	-
Profitable transfers of innovation from one location to another	+	-
Cheaper factors of production	+	-

	Benefits of FDI	Benefits of Exporting
Relatively easy and fast way to enter in foreign markets	-	+
Involves comparatively high levels of commitment and risk	-	+
Comparatively few resources are needed like financial etc.	-	+
Flexibility to withdraw from a foreign market easily	-	+

+ appropriate, - not appropriate

Source: Own elaboration

Table 3: Overview of geographic diversification issues

	Issues of FDI	Issues of Ex- portation
Foreign exchange risk due to different exchange rates between countries	+	+/-
Costs and risks also arise because of multiple levels of authority. As the firm expands into additional countries, it faces higher cross-border transactions costs and higher interaction costs with a wider variety and number of governments. Thus, the transaction costs theory claims that geographic diversification poses higher challenges to the management and can lead to increased coordination and communication costs	+	+/-
Political risk	+	+
Further costs are given due to greater cultural diversity	+	+
Sunk costs	+	+/-

+ appropriate, - not appropriate

Source: Own elaboration

2.2.3 Internationalization and performance

The question if internationalization leads to reduced risk of SMEs is the focus of this study. When analyzing the internationalization-risk relationship, the internationalization-performance relationship has to be included as well. Risk can be measured by means of a quasi-experiment in form of an internationalization-performance relationship during a crisis period (Song et al., 2015). This issue will be further explained in section 4.1. Consequently, it seems necessary to analyze the mentioned relationship.

The internationalization-performance relationship has been one of the central issues in international business literature. Given the high number of different conceptual and empirical studies which were conducted in terms of diversification and its impact on firm performance, different questions must be asked. In this regard, it has to be questioned which theoretical approaches already exist with respect to this subject, in which scope these approaches have been surveyed and analyzed, what kind of conclusions have been carved with respect to the relationship and effect of internationalization on firm performance and which particularities have to be considered within an empirical study of the internationalization-performance relationship.

Thus, given literature has already researched whether internationalization influences firm performance and if it creates or destroys value. Referring to the mentioned question, there are no clear results. Annavarjula and Beldona (2000) argue that prior literature is hampered by two interrelated issues: problematic measures for key variables and inconsistent results. Referring to the variables, the literature is hampered by issues with regard to the measures for the key dependent variables like performance and firm value, but also by issues with regard to the measure for the independent variables like degree of internationalization. In literature occurs a lack of uniformity across different studies and a constriction of measures used in individual studies (Morgan and Katsikeas, 1997; Douglas and Lorraine, 2004).

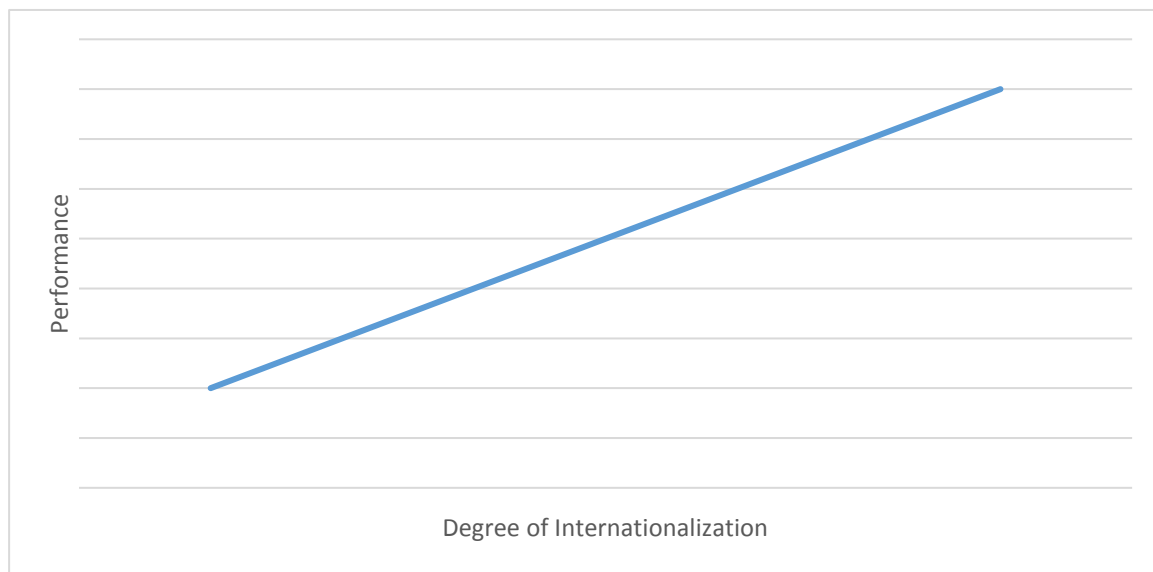
It can be concluded that there are no clear outcomes about the internationalization-performance relationship (Pangarkar, 2008). As a result, numerous researchers have argued and empirically observed that higher levels of internationalization lead to higher firm performance (e.g. Errunza and Senbet, 1981; Grant, 1987; Kim and Lyn, 1986; Kim et al., 1993; Pangarkar, 2008; Qian, 1996; 1997; 2002). In addition, other authors could not find any effect

(e.g. Buckley et al, 1977; Morck and Yeung, 1991). Then again, others found a negative effect (e.g. Collins, 1990; Michel and Shaked, 1986; Shaked, 1986) or a curvilinear relationship (e.g. Ruigrok and Wagner, 2003; Capar and Kotabe, 2003). In the following the different evidence is presented.

Linear positive effect

Pangarkar (2008) analyzes, based on analyses of 94 survey responses provided by SMEs in Singapore, the relationship between the degree of internationalization and performance. Drawing from the internationalization process and location theories, he proposes a new measure for the degree of internationalization which takes beside the export intensity, the dispersion of sales across geographic regions into account. In addition, he deploys a perceptual, multi-item measure of performance. The results support the central arguments that higher degree of geographic diversification leads to better performance. He also found support for the perception that firms investing in more attractive environments generate better performance (Pangarkar, 2008). Other authors and researchers like Errunza and Senbet (1981), Grant (1987), Kim et al. (1993) and Delios and Beamish (1999) also found evidence for a positive relationship between the degree of internationalization and performance. They mainly explained the positive effect with the internalization theory. The mentioned theory explains that firms increase performance by optimally internalize international transactions. They consequently spread risks, achieve economies of scale and scope, sell to new customers, and reap additional returns from investments in marketing and innovation (Thomas, 2006).

Figure 1: Linear and positive relationship

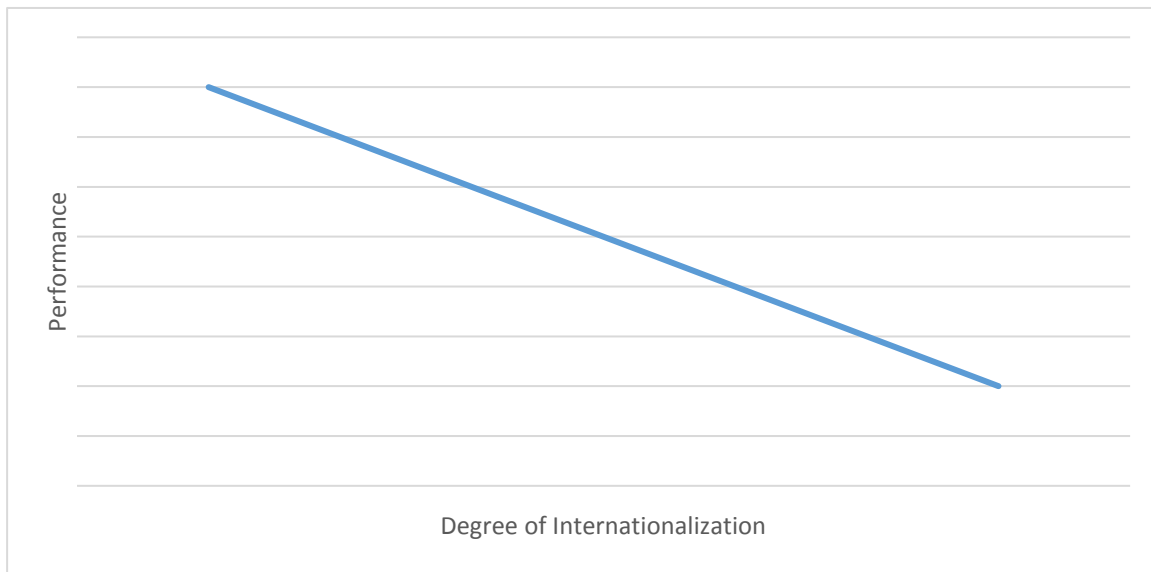


Source: Own elaboration

Linear negative effect

To profit from internationalization and obtain the previously mentioned benefits is not automatic and guaranteed. Different evidence from several authors exist, that the degree of internationalization has a negative effect on firm performance. Johanson and Vahlne (1977) claim that particularly firms being in an early stage of internationalization face a disadvantage relative to domestic ones because of their lack of experience of the target market as well as of the needed knowledge (Johanson and Vahlne, 1977). Further authors like Fatemi (1984) and Michel and Shaked (1986) confirm the existence of a negative relationship.

Figure 2: Linear and negative relationship



Source: Own elaboration

No effect

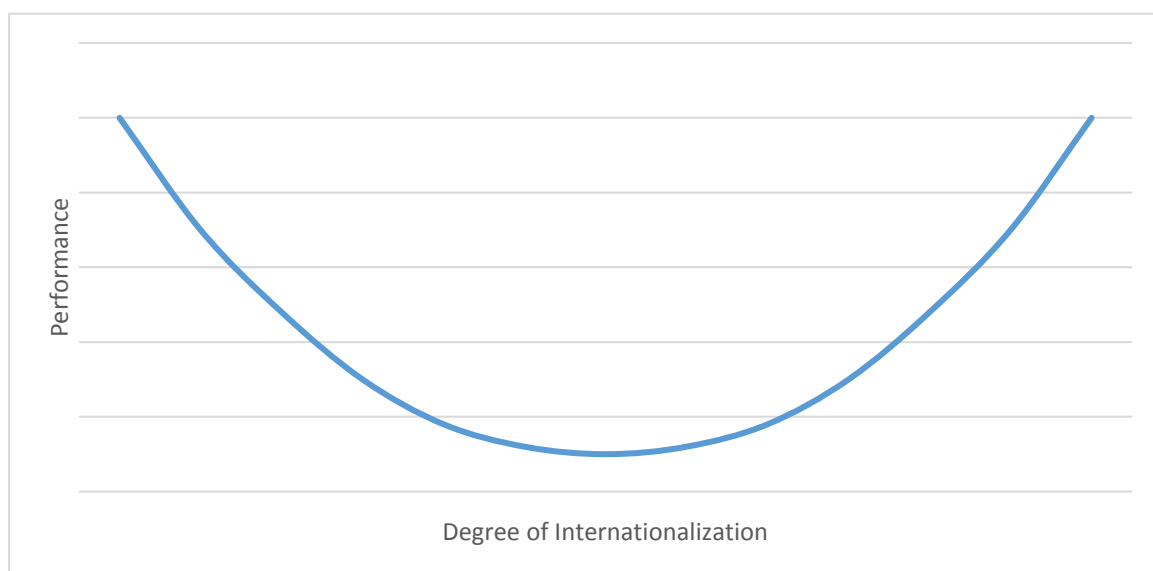
Beyond the positive and the negative effect, other researchers do not find any effect. Thus, Morck and Yeung (1991) or Gomez-Mejia and Palich (1997) do not detect any significant effects of degree of internationalization on performance in its researches. One reason for this outcome could be that the positive effects on internationalization neutralize the negative effects.

Up to this point it was presented that the literature shows contradicted and ambiguous results by analyzing the internationalization-performance relationship. In addition to the previously described linear positive, linear negative and no effect, other empirical studies concluded curvilinear relationships, but also with inconsistencies. For instance, different researchers concluded in their studies a U-shaped relationship between the internationalization and the firm performance. This means, the performance is first declining and then rising with the higher degree of internationalization (e.g. Lu and Beamish, 2001; Ruigrok and Wagner, 2003). Other authors in turn found evidence for an S-shaped relationship or rather an inverted S-shaped relationship (Lu and Beamish, 2004; Contractor et al., 2003). Recent investigations propose also an M-curve and an inverse M-curve (Almodovar, 2012).

U-shaped relationship

Different researcher found a U-shaped curvilinear relationship when internationalizing. Among them are Hitt et al. (1997), Capar and Kotabe (2003), Lu and Beamish (2001) as well as Ruigrok and Wagner (2003), Thomas (2006). Ruigrok and Wagner (2003) explain the U-shaped relationship as a result of the fact that the firm organization can learn the accomplishment of the increased degree of complexity with the progress of the internationalization process. Thus, a firm experiences a negative performance when starting to expand internationally due to the liability of foreignness. Through gaining experience over time and organizational learning, firms are able to gain positive benefits from their internationalization (Thomas, 2006). However, the U-shaped relationship could also be explained from a static perspective. Thus, the marginal complexity costs of the internationalization are relatively the highest. This means that the complexity costs rise sharply if a firm starts to diversify geographically. But, after an initial successful internationalization, the costs rise only slightly when conducting a global internationalization. If at the same time the internationalization revenues are linear, there occur a U-shaped relationship between the degree of internationalization and performance (Jansen, 2006).

Figure 3: U-shaped relationship



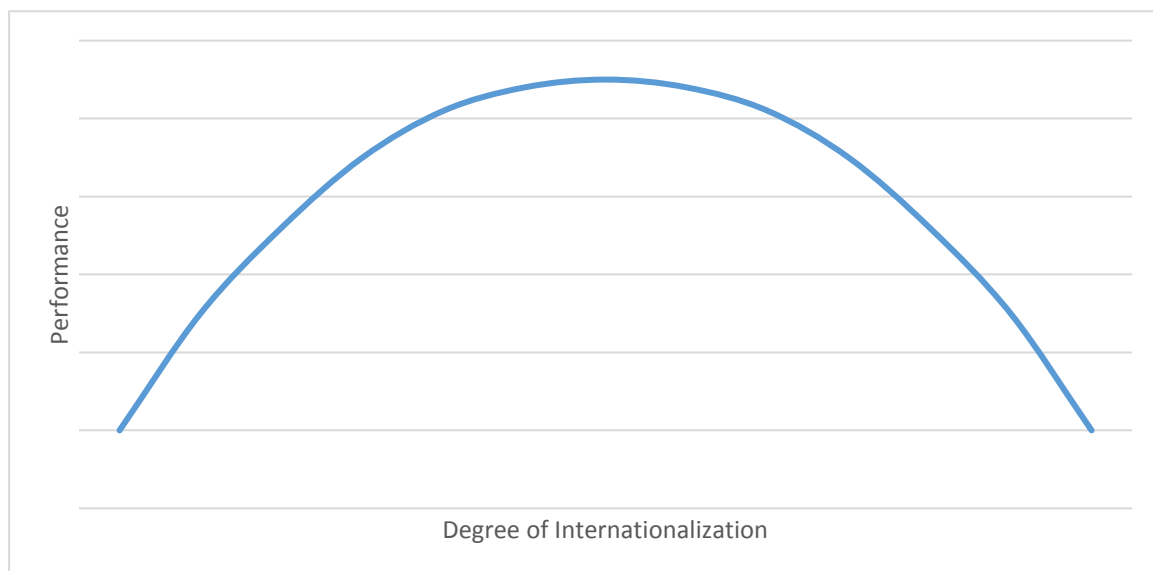
Source: Own elaboration

Inverse U-shaped relationship

Thomas and Eden (2004) are in agreement with other empirical researchers who found a curvilinear relationship between the degree of internationalization and firm performance which particularly is an inverted U-shaped relationship, first rising and then declining. Among these researchers are Daniels and Bracker (1989), Gomes and Ramaswamy (1999) as well as Hitt et al. (1997).

The inverted U-shaped relationship implies that the degree of internationalization carries both, benefits and costs. Thomas and Eden (2004) argue that the U-shaped relationship occurs because the benefits decrease while the costs increase as the degree of internationalization increases. The relationship between degree of internationalization and firm performance should be non-linear, first rising and then decreasing. While the degree of internationalization rises, the costs and risks of multiple authorities, values and cultures should rise too. The relationship between degree of internationalization and performance depends on a firm's ability to manage the complexities inherent in the internationalization process (Thomas and Eden, 2004).

Figure 4: Inverse U-shaped relationship

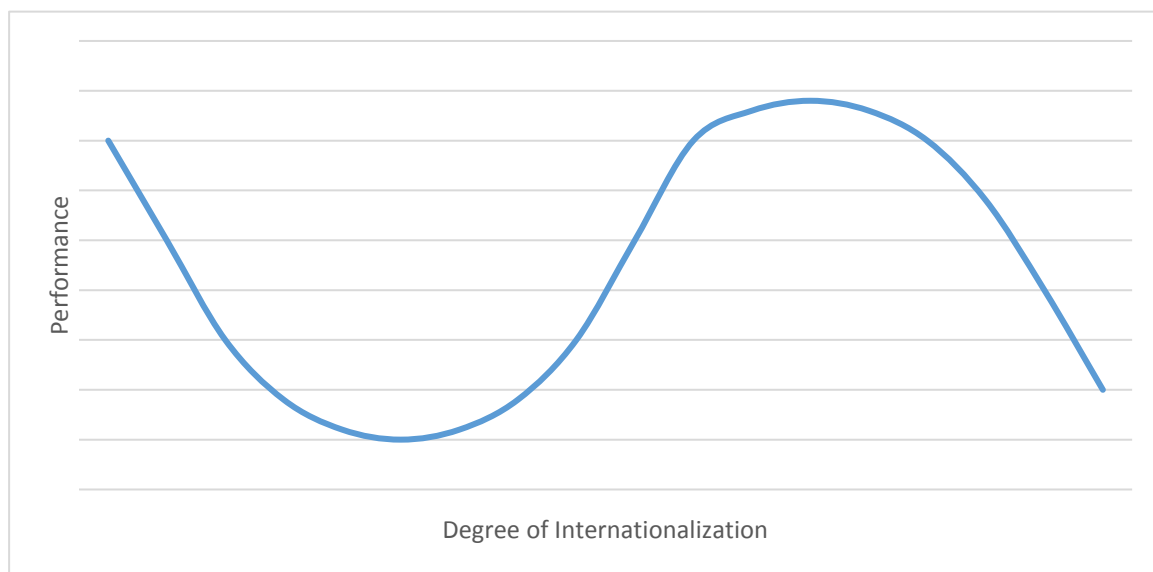


Source: Own elaboration

S-shaped relationship

Lu and Beamish (2004) synthesized the results of a range of empirical studies and supposed a multi-stage sigmoid relationship or rather S-shaped relationship. In their empirical study, they found evidence for the hypothesized effect on firm performance. The S-shaped relationship indicates that firms experience first negative returns when starting internationalization because of the liability of foreignness. In the further development of the internationalization process they gain knowledge and experience which in turn leads to positive returns, up to an optimal point. Nonetheless, negative returns can occur as the organizational costs outweigh the benefits of international diversification in the further internationalization process. Other empirical researchers agree with Lu and Beamish (2004) and found also an S curve. Among them are Contractor et al. (2003) or Tsai (2013).

Figure 5: S-shaped relationship

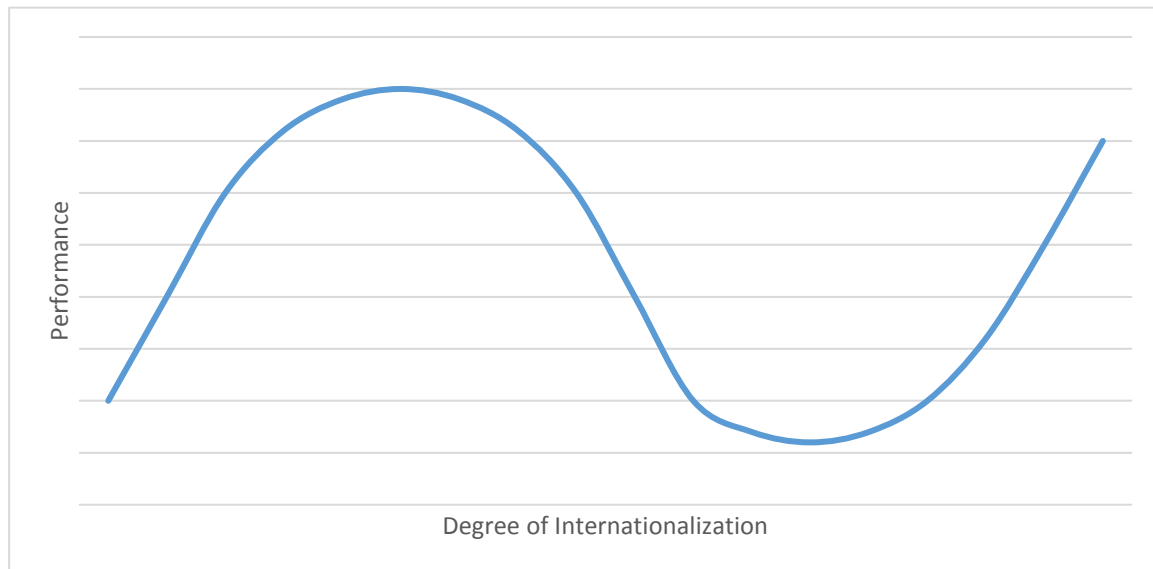


Source: Own elaboration

In addition to the S-curve, further authors found an inverted S-shaped relationship. Among these are Thomas and Eden (2004), Contractor et al. (2003) and Ruigrok et al. (2007). They argue firms experience positive returns initially by internationalizing. Then, over time internationalization leads to complex managerial problems and negative performance. Finally, over

the long-run very high levels of internationalization can be managed which results in positive performance.

Figure 6: Inverted s-shaped relationship

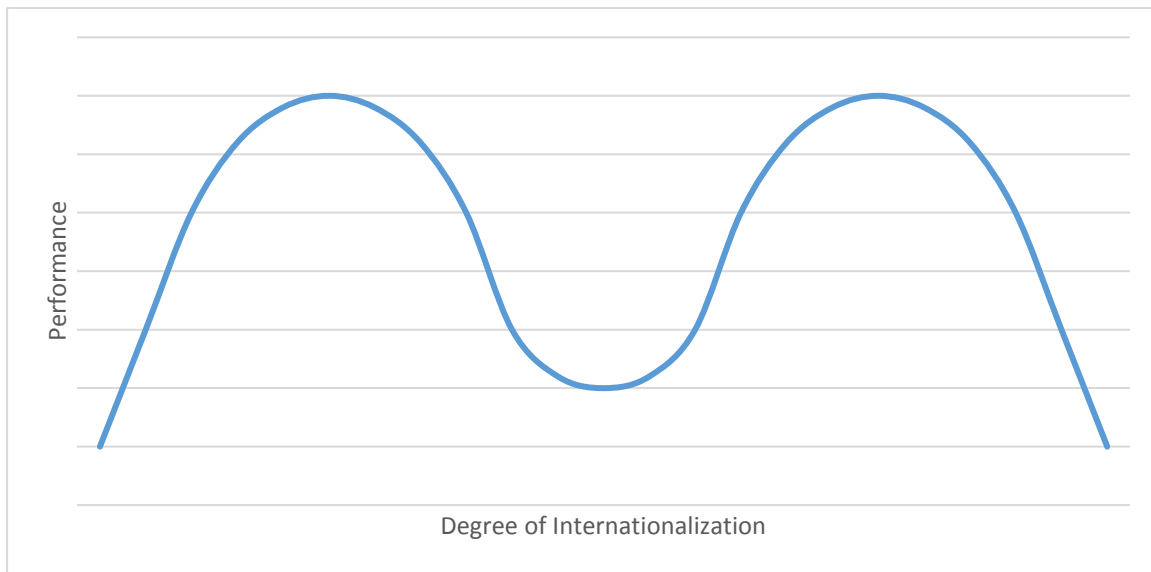


Source: Own elaboration

M-shaped relationship/ Inverted M-shaped relationship

Apart from the previous outcomes there is also evidence for an M-shaped relationship. Almodovar (2012) was one of the first researchers who found empirical support for an M curve relationship between the degree of internationalization and performance. He found empirically that exporting firms with a standardizing orientation perform differently from customizing firms as the degree of internationalization increases. There are complex interactions between financial performance and the degree of internationalization in which standardizing firms demonstrate an M-shaped relationship, whereas customizing firms demonstrate an inverted M curve relationship (Almodovar, 2012). In addition, Lee (2010) also found evidence for an M-curve relationship. In detail, it is a fourth-degree polynomial fit between degree of internationalization and firm performance (Lee, 2010).

Figure 7: M-shaped relationship



Source: Own elaboration

By observing the results of the internationalization-performance relationship obtained in previous research, it is obvious that there is a broad consensus that the results have, reaching from a linear positive and negative relationship till non-linear relationships. The non-linear relationships can have a U-shaped, S-shaped or an M-shaped curve, who also can be inverse.

2.2.4 Inconsistency in internationalization-performance results

The previous section has demonstrated that the results in the literature dealing with the internationalization-performance relationship are inconsistent. The inconsistency in the results of the different empirical studies could have occurred for different reasons such as different periods of time, different geographical context or due to the diversity of the applied measures and variables. However, in these aspects similar studies produced inconsistent results as well. Hence, Christophe (1997) analyzed the internationalization of US companies in the period from 1978 till 1986. He concludes that the Tobin's q of geographic diversified firms is 6% lower than those companies that were geographically focused (Christophe, 1997). Click and Harrison (2000) made an analysis for the period from 1984 to 1997 with a similar methodology. They concluded a discount between 8% to 17%. Bodnar et al. (2003) also undertook their

analysis for US companies for the period from 1984 till 1998. For the performance variable, they used the excess firm value. This study resulted a valuation of internationalized firms amounting to 4%. Denis et al. (2002) made an analysis for the period from 1984 till 1997 for US companies by utilizing the same performance variable, thus excess firm value. They observed a discount of 18%. These examples show that similar studies can produce contradictory results.

From the present section can be concluded that a broad range of literature regarding the internationalization-performance relationship does exist. Even though a broad literature evidence exists, the results are far from conclusive and the literature regarding the effect of internationalization on risk and the literature regarding SMEs and exporting is limited. Due to the present work focusing on the effect of internationalization in form of exports on risk, the following section gives first a broad review about the internationalization-risk relationship and in particular an overview on the exportation-risk relationship.

2.3 Internationalization and risk

After the literature review of the relationship between internationalization and performance, the present section gives an overview about the internationalization-risk relationship, which is also the research question in the present work. In chapter 2.3.1 the general relationship between the export activity and risk is analyzed to prove if the internationalization in form of exportation is able to reduce firm's risk. This can be seen as the natural risk coverage. In this regard, two different effects of the exporting activity on risk exist which influence the mentioned relationship in the direction and strength. First, the effect of export diversification on risk is analyzed. In a further step, the effect of exporting activity on operative flexibility is shown. This signifies that beyond the natural risk hedging, exporting provides firms also with operational flexibility, which can reduce the risk as well. The two mentioned effects can also be seen as the explanation of the risk reduction. In the first step it is consequently clarified that the internationalization has the ability to reduce firm's risk. In the second step two reasons are proposed to explain the reason of the risk reduction. These are the diversification effect and the operational flexibility effect. Three hypotheses are implemented in the present section.

2.3.1 Effect of export activity on strategic risk

In the following, the risk implication of the export activity which in detail means how the export activity affects the risk, will be analyzed. The relationship between the export activity and risk appeared as an important theme in the current internationalization literature. First, the term of risk especially in the internationalization literature has to be clarified. Referring to this, risk is named as a central concept in the internationalization literature and research (Liesch et al., 2011). Firms are placing greater importance on risk management. The development and utilization of risk management techniques have contributed to operational and strategic risk reduction. Researchers use therefore different definitions for risk in various disciplines (Althaus, 2005). A general definition is made by Al-Bahar and Crandall (1990). According to them, risk can be seen as “the exposure to the chance of occurrences of events adversely or favorably affecting project objectives as a consequence of uncertainty”. In the internationalization literature, risk is identified as the instabilities and vulnerabilities of firms that engaged in internationalization and which impose limitations, restrictions and/or losses (Hsieh et al., 2010). Hence, it is a consequence of uncertainty. Events are defined as certain if the probability of their occurrence is 100% and completely uncertain if the probability of occurrence is 0%. In between these extreme probabilities, the uncertainty varies widely (Jaafari, 2001).

Accordingly, risk can be a possible source of loss for the firm that might arise from the pursuit of unsuccessful decisions. Furthermore, it can also be a possible source of profit that might arise from the pursuit of successful decisions. Risk focuses consequently on the outcomes of decisions in a positive way as opportunity and in a negative way as downside losses (Roberts et al., 2012). Risk as downside loss focuses on the likelihood and magnitude of potential losses. In contrast to this, risk as opportunity focuses on firm’s upside potential (Alvarez and Barney, 2005).

Therefore, strategic risk is identified in the literature as an event that is able to have significant performance implications on firms (Elango, 2010). In detail, strategic risk is related to the risk at corporate level and it affects the development and the implementation of firm’s strategic decisions. Consequently, strategic risk focuses on the outcomes of strategic decisions. Strategic risk might arise e.g. from an incorrect strategic plan, from making poor business decisions, from the incorrect assessment of future market trends, or from inadequate re-

source allocation. Furthermore, strategic risk is generally more difficult to manage than operational or project risk and it includes risk that is related to firm's long-term performance which includes different variables like the market, corporate governance and stakeholders (Roberts et al., 2012).

Risk management is detected in the literature as a strategy in order to handle and limit the potential downside losses that are accompanied by unsuccessful decisions. In this regard Schmit and Roth (1990) defined risk management as the performance of activities designed to minimize the negative impact of uncertainty regarding possible losses. In addition, firm's risk management is the art and science of planning, assessing, and handling future events, in order to guarantee a favorable outcome and the act or practice of dealing with risk (Silvers, 2005).

It can be claimed that the goal of risk management is to measure the potential risks in order to monitor, control and decrease them. Referring to this, firm internationalization or rather the export decision is considered as one available strategic option, in order to reduce the strategic risk. The impact of the internationalization process on risk presents a complex relationship which has been approached from a number of different perspectives and researchers. Nevertheless, similarly to the internationalization-performance relationship presented in the previous chapter, the existing empirical evidence regarding the relation between internationalization and risk is not completely consistent among the researchers (Elango, 2010).

A first analysis of exporting activities expected impact on risk was proposed by Hirsch and Lev (1971). They adapted the model of Markowitz-Tobin portfolio selection to the selection of exporting markets. They found that an adequate internationalization strategy is able to contribute to a revenue stabilization by reducing firm's vulnerability to a domestic demand shock. Based on this, Rugman (1976) builds a conceptual framework in order to conclude that MNEs have reduced risk in comparison with non-internationalized firms. Nonetheless, Reeb et al. (1998) demonstrate that MNEs have, contradicting to the expectations, a higher level of systematic risk. In the same theoretical framework, Choi (1989) developed a model for MNEs, with the result that an internationalization strategy reduces firm's risk.

Thus, some researchers e.g. Kim et al. (1993), Allan and Pantzalis (1996) and Elango (2010) claim that internationalization is associated with the capacity of risk reduction and higher profits, especially by responding beneficially to changes in firm's environment. Other researchers in turn like Burgman (1996), Reeb et al. (1998) as well as Reuer and Leiblein

(2000) argue that firm's risk increases with the degree of internationalization. In this regard, Reeb et al. (1998) argue that the additional risks which are accompanied by internationalization are higher than the internationalization benefits because internationalization leads to an increase in firm's level of systematic risk. An alternative upstream-downstream hypothesis is proposed by Kwok and Reeb (2000) in the internationalization-risk research. They suggest that the overall effect of internationalization on risk is expected to vary with different local and foreign market conditions.

In consequence, internationalized firms do not necessarily obtain benefits through lower levels of downside risk. The results are mixed in this stream of literature and not consistent among the different researchers, reaching from positive to negative risk outcomes generated through internationalization or rather the export activity. As shown, different authors such as Rugman (1976), Allen and Pantzalis (1996) as well as Lee et al. (2006) observed that international investments in form of exportation generate more value than geographic concentration. Other researchers like Reuer and Leiblein (2000) obtained contradictory results regarding the risk reduction capacity associated with the increase of international investments. Nevertheless, as already shown in previous sections, firms can profit through their internationalization strategy in form of better performance. This can be used as a first indicator to make the conclusion that the generation of better performance subsequently reduces the risk as well. When using performance in order to avoid the risk definition, it refers to the quasi-experiment methodology. Different authors have already used this methodology and it is further explained in section 3.1 (Chung and Beamish, 2005; Lee and Makhija, 2009; Song et al., 2015).

However, beyond the indirect effect through performance on risk, there is also evidence that the export decision has a direct positive impact on risk. The exporting activity can be used as a risk diversification method through the spread of sales over different markets with different business cycle conditions or in a different phase of the product cycle. Consequently, the export activity is able to provide an opportunity in order to substitute sales at home by sales abroad when the home market is impacted by a negative demand shock. Otherwise, the demand shock would force a firm to close down (Wagner, 2012).

Thus, the exporting activity is considered in the literature as one available strategic option to reduce the strategic risk. Different empirical results indicate that an adequate internationalization strategy in form of exports is able to reduce the strategic risk (Miller and Reuer, 1998;

Wagner, 2012). The risk can be reduced by increasing the internationalization in terms of a higher scope of operation across different countries and reducing the dependence on a single country (Elango, 2010). An overview of empirical evidence and the results regarding internationalization and risk is given in table 5. The mentioned capacity of risk reduction through export activity is named in the present work as the export effect. The findings from this section suggests that exports can have a positive effect on strategic risk which means a significant reduction of firm's strategic risk. This is mainly due to the internationalization benefits that outweigh the costs (See table 2 and table 3). Consequently, the first hypothesis proposes that the internationalization in form of the export activity reduces firm's strategic risk.

Thus, the first hypothesis is:

H1: Export activity reduces strategic risk (export effect)

2.3.2 Effect of export diversification on strategic risk

The previous sections provide evidence of the existing relationship between export activity and performance as well as strategic risk. It has been explained and presumed that export activity increases the performance and consequently reduces the strategic risk. This relationship is named in the following work as the export effect. Given these findings, a number of studies have already explored possible moderators that affect the direction and/or strength of the relationship between the export activity and risk. On this point of literature review, the reasons have to be clarified, why, and to what extend export activity reduces firm's risk. One explanation is named in the literature as the export diversity or export diversification. Previous researchers have already been interested in the analysis of international or export diversification and its effect on performance respectively risk (Hitt et al., 1997; Thomas, 2006; Contractor et al., 2007; Pangarkar, 2008). As a result, this section moves on to describe and discuss the effect of export diversity or export diversification on performance and strategic risk. In order to provide a suitable and complete overview, firstly the term of export or international diversification must be described.

Hitt et al. (1997) defined international diversification as a firm's expansion across the borders of global regions and countries into different geographic locations, or markets. In this definition, the term of expansion or internationalization is used in the plural. Particularly this means the expansion to more than one country. Subsequently, it became interesting to explore whether there are differences in the internationalization-performance and risk relationship when using different target destinations or using a different amount of geographic areas (Thomas, 2006; Pangarkar, 2008). In order to analyze this issue, geographic areas respectively regions must be defined and clarified firstly.

The identification of the smallest geographic delineated unit is comparatively unproblematic. The national state constitutes in reference to political, social and judicial criteria an extensively homogenous entity. However, several national states have a greater similarity than others. To determine the different degrees of relatedness, several national states can be centralized into superordinated economic areas respectively cluster. Regarding several criteria, the mentioned economic areas display similar characteristics. As criteria, can be mentioned for example the geographic position, the language, and the religion (Ronen and Shenkar, 1985). Weber (1969) defines the technological development status of a country as one criterion and Berry (2004) uses similarity of cultures, customer needs, living standards, and levels of economic development as criterion.

Hofstede (1983) developed an index, whereby the cultural differences between national states can be evaluated. This index implies the role of a superior in a hierarchical organization, the readiness to assume risk, the desire of individuality, and the masculinity of the value system of a society.

Johanson and Vahlne (1977) in turn implemented the conception of the psychological distance between the home and the import country. They define the psychic distance as the sum of factors preventing the flow of information from and to the market. Hence, this term refers to differences such as language, culture, business practices, politics, levels of education and industrial development. They also claimed, that firms tend to begin to internationalize in countries with a low psychological distance and then progressively enter into more psychologically dissimilar countries.

Due to the fact that the cluster changes depend on the scope of work, the selection of the criteria and the research person, Ronen and Shenkar (1985) developed a synthesis of country clus-

ter. Table 4 displays the mentioned synthesis. It enables the distinction of the related and non-related internationalization.

Table 4: Internationalization by Ronen and Shenkar

Economic area	Attendant country
Nordic countries	Denmark, Sweden, Norway, Finland
Germanic countries	Germany, Austria, Switzerland
Anglo-Saxon countries	USA, Australia, Great Britain, New Zealand, Canada, South Africa, Ireland
Latin European countries	Italy, Belgium, France, Spain, Portugal
Latin American countries	Peru, Chile, Mexico, Columbia, Venezuela, Argentina
Far Eastern countries	Singapore, Hong Kong, Taiwan, Indonesia, South Vietnam, the Philippines, Malaysia, Thailand
Arabic countries	Abu-Dhabi, Kuwait, Oman, Bahrain, United Arab Emirates, Saudi Arabia
Near eastern countries	Greece, Turkey, Iran
Independent countries	Japan, Brazil, India, Israel

Source: Own elaboration based on Ronen and Shenkar (1985)

Relative similarity between countries in a specified cluster or also called region has important strategic implications for internationalized firms. Referring to this, the transaction cost theory proposes that such similarities are able to reduce costs e.g. coordination costs, distribution costs, management costs, information searching costs and information processing costs. The reason for the cost reduction are the similarities within such regions that reduce manage-

rial, technological, as well as coordination complexities and as a result facilitate the communication among business units that are located in different countries (Williamson, 1985). The transaction cost theory proposes beside the benefits, costs as well. Thus, the cultural diversity which arises from operations in different regions and markets is accompanied by various problems of communication, coordination, control, and motivation (Kogut and Singh, 1988).

Another theory with important strategic implications for internationalized firms is the organizational learning theory. This theory suggests that similar environments within a region facilitates the learning and hence reduces uncertainties (Habib and Victor, 1991). Thus, knowledge gained in a certain country can be applied easier to similar countries in the same cluster or region than to dissimilar countries in another region. Moreover, operations in different countries of the same region can assist the firm with product and marketing knowledge. The newly gained knowledge can be combined and simply included in the present business in order to create new competencies (Eisenhardt and Martin, 2000; Li and Quian, 2005).

Choi (1989) developed a model where he analyzed how the covariance between prices, costs and exchange rates, generates a natural risk coverage. From this model can be derived, that not all strategies with regard to the selection of international markets should be enabled with the same ability of risk diversification. The incorporation of markets with different economic cycles in comparison to the domestic market, should enable firms with a higher capacity for the reduction of risks.

Thomas (2006) analyzed international diversification and firm performance by using a sample of Mexican firms which included 386 firms over the period from 1994 to 2001. He could not identify the distance as a variable which has impact on the relationship between internationalization and performance. Thus, he claims that firm's focusing their foreign sales on more proximate markets does not have any performance implications. This contrasts with previous research which found evidence that increasing geographic distance does affect internationalization and performance.

Bellone et al. (2010) found that worldwide exporters demonstrate higher productivity than firms exporting only within Europe. Furthermore, the TFP distribution of European exporters does not show any significant differences from the TFP distribution of domestic firms. Consequently, there is no exporter premium for firms exporting only within Europe, but there is a positive and significant premium for worldwide exporters.

In contrast to the previous results, Wagner (2007) found that firms exporting within the Eurozone are more productive than domestic firms, but less productive than firms selling additionally outside the Eurozone.

In addition, the geographical scope has to be considered as well because it influences the level of diversification. This means the number of countries in which the firm is exporting. Thus, the more countries a firm export to, the more diversified the firm is in conclusion and as such the performance improves in respect to risk reduction (Goerzen and Baemisch, 2003). Castellani et al. (2010) also found that differences in the characteristics of firms does exist, depending on the number of countries the firm is trading with. Thus, firms that export to a larger number of countries are in average larger, more productive, and more capital intensive. In the same manner, De Loecker (2007) found a positive and significant correlation between the number of exporting countries and productivity.

The literature on exports and productivity also deals with the question of diversity. The findings imply that firms exporting to a higher number of foreign countries are generally more productive than firms exporting to a smaller number of foreign markets. The reason for this is that the previously mentioned additional costs e.g. preparing a user's manual in another language, or checking the relevant national laws recur for each single market (Wagner, 2012).

In conclusion, numerous studies and different theories in international business have shown that the internationalization of firms is a process in which the firms increase their international involvement. But, as already shown, firms focusing on closer markets, have to be distinguished from firms exporting to less close markets. Authors like Qian et al. (2008) claim that the export destination countries have to be distinguished in order to enable an adequate analysis. They claim that empirical inconsistencies in the results of internationalization measurement are in general due to the erroneous measurement of costs, which are associated with the internationalization process. These costs can be e.g. administration and control costs. In detail, such measurement methods are related with difficulties because they ignore the dissimilarities among overseas markets. They mention the example that cultural and trade barriers between the US and Canada are far less than those between the US and China. Consequently, the Canadian firm will experience much lower operation costs in the US than in China.

Hence, for the precise measurement of benefits and costs and especially the risk reduction capacity associated with internationalization, the different countries or markets that a firm has

entered have to be distinguished. They named such clusters of countries that are relatively similar in terms of culture, economic development, and psychic distance, as regions. In this regard, a firm which is operating in several countries but only focused in one region, should have lower operation costs than a firm which is operating in the same number of countries, but widely dispensed across different regions. This in turn can have significant implication on the risk reduction capacity (Qian et al., 2008).

The previous section has shown that export activity is able to reduce firm's risk. This chapter introduced the question, why internationalization is able to reduce firm's risk. Consequently, it dealt with the issue concerning the relationship between export activity and internationalization. One explanation discussed in the present chapter is the export diversity also called export diversification. It can be concluded that due to export diversification, a firm's risk can be reduced. Furthermore, it can influence the strength of the relationship between export activity and performance as well as risk by a higher or a stronger capacity risk reduction.

Based on the arguments in the present section, it is obvious that export diversification is one reason for firm's risk reduction and it is able to reduce significantly firm's strategic risk or in the same manner to act as an accelerator by influencing the strength of the performance and risk reduction.

Thus, the second hypothesis is:

H2: Export diversification reduces strategic risk (diversification effect)

2.3.3 Effect of export activity on operative flexibility

Section 2.3.1 has already clarified that exporting activity has the ability to reduce the strategic risk. Subsequently, the causes leading to risk reduction must be examined and explained. One reason was identified and discussed in the previous section namely export diversity. A further reason may be the operative flexibility which is observed and analyzed in the present section. In this regard, the concept of real options in international investment choices is explained. The

real options theory suggests that internationalization reduces the downside risk of a firm (e.g. Cyert and March, 1963; Kogut, 1991; Lee and Makhija, 2009).

2.3.3.1 The real options perspective

Definition of real option

When observing the real options perspective in internationalization-risk issues, first the term of real options has to be defined. In this regard, different authors already have adopted real options research in strategy to enable an adequate analysis. It represents a promising theoretical tool, with which the relationship between international investments and performance as well as risk can be evaluated (e.g. Bowman and Hurry, 1993; Lee and Makhija, 2009; Belderbos et al., 2014). Even though, real options theory is applied in strategic management, it has its roots in finance literature. In this regard, real options within strategic decisions refer to the preferential access to an opportunity for investment choices with the intention of gaining an advantage over competitors or in order to be better equipped for various courses of action. In detail, these are investments in real assets which gives the firm the possibility to undertake determined decisions in a future period. Real options capture the flexibility offered to the management, in order to adapt to the requirements for an uncertain environment (Sanchez, 1993; 1995).

Options arise when present resources and capabilities allow superior access to future opportunities. In detail, this can be growth or switching opportunities, which will be further explained in section 2.3.3.2. Furthermore, options can fall into two basic categories which are incremental and flexibility options. Incremental options can be named as simple call and put options. Flexibility options can be explained as the opportunity to switch investment streams (Bowman and Hurry, 1993). The present study puts emphasis and analyzes flexibility options in international investment decisions. This is because flexibility, generated through the export decision will be analyzed with its effect on firm's performance and risk.

When observing and analyzing real options in strategic decisions, the treatment of uncertainty has to be taken into consideration, because it is an important part in real options theory. In this regard, König (2009) claims that the real options theory was employed to examine the deci-

sion-making in uncertain environments by a firm. The treatment of uncertainty coming from real options theory is recent and novel (Reuer and Tong, 2007). Nevertheless, the strategic management literature is concerned with strategic choices and directions of a firm, which can influence the performance and risk. The real options theory is able to detect sources of uncertainty and assign values to the various options embedded in firm's strategic decisions and investment choices (Reuer and Tong, 2007). Regarding this, an option's value rises, when the volatility of the underlying asset increases.

It is important to reflect and analyze the external conditions under which international investments are examined (Lee and Makhija, 2009). Kogut (1983) first argued that internationalization provide firms with real options that offer the potential for flexibility. Real options within an investment enable firms with the opportunity to change its strategy with reduced costs by choosing from an alternative set of actions that best faces newly emerging and unanticipated conditions (Song et al., 2015).

The operative flexibility specifies the investments in real options. König (2009) claims that the underlying asset of a real option can be any type of equipment. In detail, assets of real options can be production facilities, business units, R&D projects, intellectual property rights or any other business asset. As already mentioned in previous sections, the strategic decision or investment this study deals with is the decision of internationalization or rather the export decision and the resulting impact on performance and risk. Consequently, the asset of real option is the export.

In addition, real options are to distinguish from financial options in form of financially traded securities. Consequently, real options have significant differences to financial options in at least three ways. The first difference is that real options enable the investing firm with the access to knowledge, that a non-investing firm cannot obtain. The second difference is that real options are able to provide access to resources, which competitors without such investments do not have. The third difference is that real options provide firms with learning advantages, which can be leveraged into a competitive advantage (Bowman and Hurry, 1993; Buckley et al., 2002; Brouthers et al., 2008). In this regard, the generation of international knowledge is converting into an important factor of operative flexibility associated with exporting and enables the firm consequently with the capacity of risk reduction.

When high environmental uncertainty is perceived, options should be held open in order to reduce potential losses as much as possible. On the contrary, when there is perceived low environmental uncertainty, the options should be carried out in order to gain earnings in terms of growth and profits, as much as possible (Bowman and Hurry, 1993). Thus, uncertainty is a key issue for firms and refers to the inability to anticipate future developments that are exogenous or endogenous to the firm. Uncertainty is consequently the critical feature of any real options argument and can arise from diverse exogenous and/or endogenous sources (Song et al., 2015). Among them are unanticipated fluctuation in currency exchange rates, unexpected changes in host market demand, unforeseen changes in the macroeconomic environment of a certain country and political instability (Chung et al., 2010; Cuypers and Martin, 2010; Song et al., 2015). In the situation where a firm is facing uncertainty, the investment decision in form of options, which enables the firm to benefit from unanticipated opportunities, would be valuable to the firm (Song et al., 2015).

Different types of uncertainty exist. The country-level uncertainty is the abrupt change in the macroeconomic environment of a certain country. The exchange rate uncertainty refers to a rapid and unanticipated change in the value of host countries currency and the demand uncertainty means the change in a host countries industry structure or fluctuations in marked demand. A numerous number of researchers have identified and determined these three sources of uncertainty as significant and relevant for testing real options arguments (Song et al. 2015).

The present work analyzes the internationalization in form of the export decision as a risk reduction method during crisis periods. Consequently, the focus is rather on country-level uncertainty than on demand or exchange rate uncertainty. Thus, a country-level uncertainty can be specified by an economic crisis. The present work uses the European economic crisis in the period between 2007-2011 as a quasi-experiment to test the hypotheses. The mentioned type of uncertainty and the quasi-experiment will be further explained in section 3.1.

Definition of operative flexibility

The capacity of a firm to face uncertainty depends on operational flexibility (Sanchez, 1993; 1995). It is considered that internationalization is one of the strategic flexibility sources. Thus, it can permit the income, cost and sales restructuration between different markets in which the

firm operates, so the operational flexibility can be recognized as a coverage strategy (Broll, 1999; Lee and Makhija, 2009; Mello et al., 1995; Lee et al., 2006; Allen and Pantzalis, 1996; Reuer and Leiblein, 2000; Kogut, 1985; Kogut and Kulatilaka, 1994).

Real options theory suggests that internationalization reduces the downside risk of a firm. Thus, investing in real options enables the firm with the ability to manage risk by proactively confronting uncertainty in a flexible manner. Hence, real options theory serves as a tool for evaluating the trade-off between commitment and flexibility under uncertainty (Cyert and March, 1963; Kogut, 1991; Lee and Makhija, 2009). Thus, exporting investments are providing firms with flexibility by connecting them with another country's market, without necessarily having to be large or to take large investments. Such investments are able to mitigate downside risks of future investments. In detail, when economic turbulence occurs in a particular country e.g. in form of an economic crisis, the firm has the opportunity to stop further investments and limit losses to the relatively low sunk costs (McGrath, 1997; Lee and Makhija, 2009). Consequently, if internationalization investments enable firms with flexibility under unanticipated adverse conditions, the mentioned flexibility would imply higher firm value under such conditions. In addition, this allows such firms to outperform firms without the mentioned investments (Lee and Makhija, 2009).

Nevertheless, firms do not benefit as much from the flexibility created through exporting-related investments during economically stable periods. The reason for this is, that there is no necessity for flexibility under such conditions of stability. The flexibility-creating investments in an exporting infrastructure would consequently not provide firms with additional value. Under such conditions, the generated flexibility would not be significant for additional firm value and risk reduction (Lee and Makhija, 2009).

In conclusion, flexibility is related with higher value for firms which are facing higher uncertainty and this leads consequently to a risk reduction. But, the subadditivity has also to be taken into consideration. Hence, firms with a set of multiple international investments, can be seen as possessing a portfolio of real options. Nevertheless, the values of the individual options in a portfolio can be subadditive. That signifies that the value of a portfolio of options is less than the summation of the values of these options if they were independent. Subadditivity focuses on the correlations between options in a firm's option portfolio. The higher the degree

of subadditivity, the less such investment will help to contain downside risk (Belderbos, 2014).

Why does the export activity generate flexibility?

After the description of the real options concept, flexibility and the connection to uncertainty in international business research, in the following the relationship between uncertainty and real options will be described. This is, in detail the value derived by firms from their real options investments. The question has to be addressed, why internationalization generates flexibility? In this regard, researchers usually consider real options value from enhanced upside potential and minimized downside risk (Song et al., 2015). Thus, previous researchers claim, that firms can benefit first, by using the option when uncertainty is resolved favorably. Second, to limit downside risk by killing the option when uncertainty is resolved unfavorably. In conclusion, firms can generate value from their real options by responding to favorable as well as unfavorable changes in uncontrollable environmental issues (Allen and Pantzalis, 1996; Lee et al., 2006; Miller and Folta, 2002; Lee and Song, 2012; Song et al., 2015). In the following the two alternatives of value generation through real options are described. In detail, value generation exist through enhanced upside potentials and through the limitation of downside risks. In the following first value generation through enhanced upside potentials will be described and then through the limitation of downside risks.

Despite evidence in literature that firms are primarily concerned with mitigating the downside effects of uncertainty (Kahneman and Tversky, 1979; Miller and Reuer, 1996), there is comparatively little empirical evidence on the value of options associated with international investments that give rise to flexibility under such conditions. By observing the findings, it can be assumed that international investments provide value enhancing flexibility benefits in an economic crisis in comparison to conditions of stability, which also indicates a capacity of risk reduction. Instead, the measurement of flexibility associated with international investments is important and identified in the literature as the firm's ability to quickly shift production to different international locations or shift sales to new international customers (Lee and Makhija, 2009).

Several different ways to measure the enhanced upside potential in form of additional value associated with real options does exist in literature. One example is the developed measure by Lee and Makhija (2009), in order to assess actual operational flexibility created by options within international investments. Thus, operational flexibility can be measured by using the preexisting export platform investments for sales to new customers when facing environmental uncertainty of a firm.

Beyond the enhanced upside potential, the evidence from various studies suggests that options embedded in international investments reduce downside losses of a firm. Miller and Reuer (1996) argue that the primary concern of firms is to minimize the potential for downside outcomes and performance. Regarding to this, firms can use their international investment structure which consists of FDI (Campa, 1994; Dunning, 1980) and exporting investments (Broll, 1999; Roberts and Tybout, 1997), to adapt their operations to unanticipated risks in ways not possible without the mentioned investments (Lee et al., 2006). Consequently, the properly used options of embedded flexibility constitute a coverage tool (Kogut, 1985). Thus, firm's investment in exporting can be seen as a coverage option, in order to limit the possibility of below-target performance outcomes, also named as downside risk. In contrast to traditional variance-based risk measures which include the entire distribution of firm performance, current measures of downside risk intend to capture only organizational outcomes below some target values (Reuer and Leiblein, 2000; Tong and Reuer, 2007; Lee and Makhija, 2009). The utilization of a natural experiment permits to avoid the risk definition. It allows the analyze of a firm's behavior with various flexibility options before a crisis period in a domestic market. The mentioned risk measurement method will be used in the present scientific work and further explained as well as analyzed in the third section of the present work.

Nevertheless, different arguments exist in favor of such measurement methods. Based on their review of behavioral decision theory, finance studies, and management research on risk, Reuer and Leiblein (2000) as well as Miller and Reuer (1996) provided different arguments for moving from variance-based measures to downside conceptualizations of risk.

Downside risk incorporates the notion of reference levels. The behavioral decision theory identifies this in turn as a determinant of risk preferences (Kahneman and Tversky, 1979). Then, Harlow and Rao (1989) have demonstrated that a downside risk model of equity returns is explaining stock returns better than the capital asset pricing model (CAPM). A further ar-

gument is that empirical research documents that decision makers tend to consider risk rather in terms of negative outcomes than as variance in outcomes, as reflected by standard risk measures (e.g. Baird and Thomas, 1990).

As a result, the present section has demonstrated the real option perspective in the internationalization-risk relationship. In this regard, real options can be seen as an important tool in order to reduce firm's risk. Subsequently, the impact of operative flexibility, which is generated through the export activity, on firm's risk will be analyzed. Thus, the exporting activity provide firms with a portfolio of switching and growth options which are linked to the capacity of risk reduction.

2.3.3.2 The impact of internationalization on operative flexibility

Kogut (1983) proposes that MNEs can modify the activity level of international affiliates to adapt to shifts in global threats and environmental opportunities. Thus, it can permit to restructure income, cost and sales between different markets in which the firm operates. Consequently, the operational flexibility can be recognized as a coverage strategy (Kogut, 1985; Kogut and Kulatilaka, 1994; Mello et al., 1995; Allen and Pantzalis, 1996; Broll, 1999; Lee et al., 2006; Reuer and Leiblein, 2000; Lee and Makhija, 2009; Song et al., 2015).

One important characteristic of geographically diversified firms is that they have the ability to operate internationally across heterogeneous external environments. Firm's internationalization involves an investment in real options, which provides the firm with the ability to manage risk by proactively confronting uncertainty in a flexible manner. According to real options theory, the network of international operations provides firms with real options, which are embedded in international investments and generally divided in two categories. Referring to this, different authors found that growth options help firms to retain flexibility under high uncertainty (e.g. Kogut, 1991; Chi, 2000; Tong et al., 2008; Cuypers and Martin, 2010; Reuer and Tong, 2010). Other authors in turn found that switching options may help firms to retain flexibility under high uncertainty (e.g. Allen and Pantzalis, 1996; Lee et al., 2006). Thus, research articles with regard to international business literature agree that international investments provide firms with a portfolio of switching and growth options which gives firms the

right, but not the obligation to exercise them (Li and Rugman, 2007; Belderbos et al., 2014; Song et al., 2015).

Allen and Pantzalis (1996) as well as Lee et al. (2006) observe that the dispersion of affiliates is generating more value than geographic concentration. Nevertheless, Lee and Kwok (1988) claim that internationalized firms have less leverage capacity than non-internationalized firms, which leads to the assumption that internationalization is accompanied by a reduction of risk. Miller and Reuer (1998) as well as Reuer and Leiblein (2000) obtained contradictory results regarding the capacity of risk reduction associated to the enhancement of the internationalization level. Rangan (1998) analyzed the factors that complicate the interrelationship between the different intern mechanisms, which permit a firm to exercise options of flexibility. Elango (2010) confirms that internationalization reduces the firm risk and that the reduction depends on the sector type in which the firm pursues their activity.

The existent evidence is limited, contradictory and especially concentrated on MNEs. In contrast to the majority of the literature, the present work is focused to analyze the effect, the exporting activity has on the strategic risk of SMEs and also the dampening effect of the foreign entry mode. Exporting firms are able to arbitrage between international markets of goods, but do not possess capacity for the arbitrage in the fiscal, financial and labor scope, as it has MNEs (Subramaniam and Watson, 2006). Consequently, the level of operative flexibility is limited. Nevertheless, growth and/or switching options are maintained in exporting markets. In this regard, an established exporting infrastructure allows firms to respond rapidly to unanticipated downward changes in domestic as well as foreign demand and consequently to reduce their risk.

In the following the two types of options are characterized and explained. The first type of real option associated with international investments is the growth option. In the second step switching option are explained.

Growth options

Growth options refer to the growth potential in the exporting country market (Song et al., 2015). Thus, growth options can be generated by undertaking investments when uncertainty is

high (Brouthers et al., 2008). Due to the fact that the real option this paper deals with is the export decision, the growth option will be deductive the enhancement of the exporting activity. Thus, evidence exist that increasing exports to several different countries contributes indirectly to firm growth and profitability, as well as to reduction of risk, by providing firms with an exposure to international markets and the opportunities to generate and develop new knowledge about various markets. The learning through exporting experience could help firms by developing capabilities to pursue more comprehensive international expansion strategies. This in turn serves as a stepping stone for further firm and profitability growth and consequently to further risk reduction (Lu and Beamish, 2006).

Switching options

Beyond the growth options, switching options also have the capacity to reduce firm's risk. Referring to this, an established exporting infrastructure allows firms to respond rapidly to unanticipated downward changes in domestic as well as foreign demand. The firm is able to shift sales from less beneficial markets to new customers in other more beneficial markets (Roberts and Tybout, 1997; Lee and Makhija, 2009). As already mentioned, this is the second option which is named as the switching option. It refers to the possibility to shift exports to other countries or regions in order to take advantage of higher prices or increasing demand (Lee and Song, 2012). This means, that the firm can lower or stop the exporting activity to a country and limit losses to the sunk costs associated with the discontinued project. At the same time the exporting activity to another country, where the current conditions give a higher amount of benefits, can be increased, to benefit from the higher potential. Thus, in the case of a rapid decline in domestic demand, the firm has the opportunity to shift lost domestic sales to foreign markets. This shift in turn increases the value of its exporting related investments. Thus, firms have the opportunity to recover losses by reason of decreased domestic or foreign demand by shifting to other markets in which it already has an established exporting infrastructure (Broll and Eckwert, 1999; Lee Mahkhija, 2009).

When observing the switching options, the subject of subadditivity between the switching options is an important issue that has to be observed as well. In this regard, Belderbos et al. (2014) analyzed how the characteristics of a real options portfolio, in terms of host country's environment, influence the relationship between internationality and downside risk. If the

characteristics of the options are correlated, the relationship of multiple options within a portfolio is negative. Consequently, the options in the portfolio are subadditive. This means, that the value of the option portfolio is smaller than the sum of the individual option values. The subadditivity in the context of multinational switching options can arise from positive correlations in host country's economic conditions. Positive correlations decrease the benefit of flexibility available from shift options and thus lower the negative impact of multinationality on downside risk. Negative correlations in turn enhance the benefit of flexibility (Belderbos et al., 2014).

However, switching options are not solely enabled with opportunities. Evidence exist also regarding to switching costs, that must be taken into consideration. Regarding to Jackson (1985), switching costs are referring to investment activities taken by a supplier or costumer that hamper the change of customers or suppliers. Thus, exporting firms that have taken high investments in switching options cannot easily change the exporting markets. It can be related with significant costs.

It can be concluded that exporting firms have an advantage over MNEs, which is the ability to shift export volumes easily to different foreign markets and consequently to change its geographic scope (Lu and Beamish, 2006). Thus, the creation of an exporting infrastructure is able to generate the required operative flexibility in order to reduce the strategic risk (Broll, 1999; Roberts and Tybout, 1997).

In this manner, previous researchers make use of real options logic in order to establish an understanding how international investments can be structured to provide firms with strategic flexibility under uncertainty and competition (Lee and Makhija, 2009; Tan and Wang, 2010; Azevedo and Paxson, 2014; Song et al., 2015).

Table 5 contains empirical evidence regarding exporting firms and risk. By observing the existent literature, it can be observed that in this stream of literature different evidence regarding MNEs does exist, but only few empirical evidence regarding SMEs and export. Lee and Makhija (2009) is the single identified evidence in the literature, that analyzed SMEs regarding the internationalization-risk relationship.

Table 5: Empirical evidence regarding internationalization and risk (operational flexibility)

Author	Measurement of operative flexibility	Methodology	Results
Lee and Makhija (2009)	<p>Value of flexibility afforded by exporting Investments</p> <p>Extent to which the firm can sell its products abroad</p> <p>Proportion of firm's export sales that was newly developed to cope with the sudden downturn of the Korean economy</p>	cross-sectional linear regression economic crisis, sample of Korean firms (1996–1998)	international investments provide flexibility during a period of economic crisis
Song (2013)	Value of multinational flexibility by extracting the EMV (excess market value) of each MNC from the averaged EMV of all domestic firms within the same industry	Sample of 2,340 observations from 125 publicly traded manufacturing MNCs listed on the Korean Stock Exchange from 1990-2007	Subsidiary's local commitment in terms of FDI depth and local sales is negatively associated with multinational flexibility value, whereas their intra-firm trade links to other affiliates are positively associated with this value
Chung et al. (2010)	<p>Two measures are used to operationalize subsidiary expansion: percentage change in subsidiary sales and percentage change in subsidiary employees</p> <p>They use the ratio of export vs local sales at the subsidiary level to operationalize the relative importance of across-country flexibility vs within-country growth options embedded in each Subsidiary</p>	<p>The 1997 Asian economic crisis was used</p> <p>The sample consisted of 1519 manufacturing subsidiaries of 471 Japanese corporations in 52 industries, operating in five Asian countries (Thailand, Indonesia, South Korea, Malaysia, and the Philippines) between 1997 and 2001</p>	The stronger the subsidiary's cross-country flexibility the greater the Likelihood of the subsidiary increasing its sales during times of economic crisis
Chung et al. (2013)	They examine how MNE divestment decisions predicted by the emerging perspective of real options differ	<p>This study is based on the 1997 Asian Economic Crisis</p> <p>The sample consisted</p>	Empirical results give consistent support to the real options perspective. Large MNEs with greater interna-

Author	Measurement of operative flexibility	Methodology	Results
	<p>from those predicted by the traditional perspective of risk diversification</p> <p>Subsidiary divestment is defined as an MNE's withdrawal from a subsidiary operation - that is, the closure or sale of a subsidiary by the MNC</p>	<p>of 2850 foreign subsidiaries of 812 Japanese MNEs in five countries from 1997 to 1999. During the observation period, 350 of the subsidiaries were divested</p> <p>They use the Cox proportional hazard event history model to investigate the hazard of subsidiary divestment</p>	<p>tional diversification are less likely to divest their subsidiaries during times of economic crisis</p> <p>MNEs may extract benefits from their internationally dispersed subsidiaries by adjusting and shifting their value chain activities across different subsidiary locations</p>
Dikova et al. (2013)	They compare the sales performance of MNE subsidiaries between two countries, over two periods, with only one country being affected by the crisis	<p>Difference-in-Difference estimator</p> <p>They examine the effects of 83 financial crises on longitudinal data of US MNE's subsidiary sales in over 50 countries in the period 1983-2005</p>	The impact of currency crises on subsidiary exports is significant and positive at (t + 1) and (t + 2)
Driouchi and Bennett (2011)	They examine the risk implications of switching options in multinational operations	<p>multivariate models</p> <p>They use a sample of 278 large MNCs with categorized degrees of real options</p>	Firms which have developed a strong managerial awareness of their real options are able to reduce their downside risk through multinational flexibility and organizational slack
Kogut and Kulatilaka (1994)	They model the coordination as the operating flexibility to shift production between two manufacturing plants located in different countries.	A stochastic dynamic programming model treats the flexibility as equivalent to owning an option, the value of which is dependent upon the real exchange rate. They lay out first the formal model of the value of shifting production in response to exchange rates.	international investments provide flexibility. Based on options, multinationality has a source of value due to uncertainty

Source: Own elaboration

In section 2.3.1 it was presumed that the exporting activity lowers firm's strategic risk in general. In the further progress of the work, two reasons were identified that influence the mentioned risk reduction. First, the export diversification was named as one import factor that influences the risk. This section suggests that real options applied in strategic and international investments are valuable and have important performance and risk implications for the firms (Reuer and Tong, 2007). As a consequence, firms which undertook investments in real options are enabled with higher ability to flexibly adapt their operations and therefore increase their performance and lower their risk. In conclusion to this section it can be claimed that the operational flexibility which is generated through the export activity reduces strategic risk. The mentioned effect is named in the present work as the real option effect. In addition, this flexibility is especially given according to unforeseen negative environmental change and in comparison to firms without such investments. Thus, it was identified that the export activity reduces the risk. One explanation is geographic diversity. The mentioned effect is named in the present work as the diversification effect. The second explanation is the operational flexibility which consists of the growth option and the switching option. This effect is named in the following work as the real option effect.

Thus, the third hypothesis is:

H3: Operational flexibility generated through export activity reduces strategic risk (real option effect)

2.4 Operative flexibility and export mode

Up to this point, three hypotheses were placed. First, it was assumed that exporting activity has the ability to reduce firms risk. In a further step the reasons for the risk reduction were evaluated which also influence the strength and the direction of the risk reduction capacity. The first reason was named as the diversification effect and the second as the real option effect. Thereafter, the present section analyzes the relationship between operative flexibility and export mode and is connected with the previously placed hypotheses. First, the internationalization process and the foreign market entry mode are explained, because it affects firm's per-

formance and risk. The present section consequently gives an overview, to assess the basis of this field, how knowledge can be added and how future entry mode research should proceed. The subsequent section links the creation of international knowledge and entry mode. In this regard, the learning by exporting hypothesis is an important issue. Finally, the establishment and analysis of a direct as well as indirect exporting infrastructure and also the needed resource commitment of the different entry modes are examined. The section ends with the setting of the final hypothesis four.

2.4.1 Export mode and internationalization process

When analyzing the export behavior of firms and the export-risk relationship, the incorporation of the theoretic framework with regard to export development models is essential. In this regard, Leonidas and Constantine (1996) first have reviewed empirical work in this stream of literature. They reviewed articles in order to identify the main models and their structural characteristics, to evaluate the methodologies used and to analyze the key conceptual issues on the subject. The objective is to explain adequately the firm's export expansion behavior. In this regard, the export expansion behavior is also associated with costs.

Nevertheless, firms can be classified by several criteria according to their stage of export development. The often-used segmentation parameters are export sales intensity, length of exporting experience and foreign market entry mode (Leonidas and Constantine, 1996). This section deals with the internationalization process and the foreign market entry mode. Referring to this, Lu and Beamish (2001) claim, that SME choice of entry mode affects their performance and therefore the risk as well.

The existing literature related to entry mode choice primarily concerns MNEs, whereby the activities of SMEs have received less attention (Nakos and Brouthers, 2002; Decker and Zhao, 2004). Nevertheless, there also exists evidence of entry mode choice regarding to SMEs. SMEs, as opposed to MNEs, have individual characteristics that are able to influence their foreign market entry mode choice in terms of the level of commitment to the foreign market, how they deal with risks in the host country, and the controllability of foreign market activities (Laufs and Schwens, 2014). Different authors have suggested that SMEs international entry mode selection is an important research area in the present stream of literature

(e.g. Burgel and Murray, 2000; Zacharakis, 1997; Jones, 1999; Nakos and Brouthers, 2002; Brouthers and Nakos, 2004; Decker and Zhao, 2004; Laufs and Schwens, 2014). One reason is that the entry mode type is significantly related to SME performance and choosing the right international entry mode can have important performance and risk implications for SMEs (Lu and Beamish, 2001; Nakos and Brouthers, 2002). This section should give an overview, to assess the basis of this field, how knowledge can be added and how future entry mode research should proceed.

It is supposed that firms which possess the necessary knowledge and the infrastructure of exportation have two sources of flexibility. The first one is the arbitrage between markets and the second is the leverage. The arbitrage permits a sales reduction in markets which are negatively affected by the exchange rate risk, country risk or demand reduction. It also permits increase sales in markets not affected by the mentioned risks or where the impact is lower (Roberts and Tybout, 1997). The leverage permits that gathered knowledge about a particular foreign market facilitates the entry in new but cultural, psychological and institutional close markets to the previously entered one (Johanson and Vahlne, 1977; Lu and Beamish, 2006).

It is not only the whole exporting activity generates compulsively knowledge and has significant implication on firm performance or risk. It depends strongly on the entry mode. Thus, the involvement of an internationalization strategy includes the development of a comprehensive product or market plan, by choosing a foreign market entry mode. In this regard, entry mode is defined as an institutional arrangement, that allows firms to use their product or service in a country exchange or an institutional arrangement that enables the entry of firm's products, technology, human skills, management, or other resources into a foreign country (Root, 1987; Rasheed, 2005). The decision regarding the entry mode choice is essential, because it is an important factor whether the firm will be successful in the entered market or not, which in turn has important implications on firm's performance and risk (Canabal and White, 2008).

Thus, firms entering new foreign markets choose from numerous different forms of entry, ranging from licensing and franchising, through exporting, to foreign direct investment (Rashed, 2005). As a result, by deciding to enter an international market, firms have to select an appropriate organizational structure, or entry mode (Erramilli and Rao, 1993; Burgel and Murray, 2000). Consequently, entry mode research is related to the international activity of firms (Canabal and White, 2008). It includes the predictors of entry mode choices, of interna-

tional equity ownership levels, as well as the consequences of entry mode decisions (Werner, 2002).

Entry modes can be divided into two different categories which are equity and non-equity ones. The two mentioned categories can be distinguished by their investment requirements and control. Equity modes are e.g. joint ventures and wholly owned ventures such as greenfields, brownfields, and acquisitions, whereby non-equity models refer to e.g. contractual modes such as licensing, R&D contracts, and alliances (Pan and Tse, 2000). As already described, the present work is analyzing SMEs rather than MNEs, thus the preferred entry mode is based on non-equity models because of the limited resources and capacities that SMEs are enabled with.

Different empirical studies have also applied export development models to examine internationalization strategies under uncertainty, such as the internationalization process, their market entry and exit decisions and their entry mode choices (e.g. Rangan, 1998; Belderbos et al., 2014; Fernandez and Diez-Vial, 2015). This stream of literature is especially important for the present work. This is because it allows to draw a conclusion on firm's risk implications. As already mentioned in the previous section, the internationalization's implication on firm risk is the central issue this scientific work deals with.

Canabal and White (2008) developed a ranked listing of the most commonly used theories and constructs in entry mode research. Regarding to this, the 10 most commonly used theories and constructs in entry mode research are listed in the following. The most frequently used theory is the transaction cost theory, which views each choice of entry mode as an individual transaction that involves a trade-off between control and resource commitment (Anderson and Gatignon, 1986). The subsequent theories are OLI/location factors, cultural distance, control, internationalization, risk, institutional theory, resource-based view (RBV), foreign direct investment, organizational/competitive capabilities, knowledge and uncertainty.

In conclusion, the findings from this section suggest that the entry mode decision and the internationalization process can have a significant effect on performance and risk. Thus, it is important to consider the entry mode choice and its impact on performance and risk in the present empirical work. Referring to this, the next section explains the creation of international knowledge in relation to the chosen entry mode.

2.4.2 Learning by exporting

When analyzing export development models and the internationalization process, a further important aspect that has to be taken into consideration is the time aspect and especially the “learning through exporting” aspect because it could influence the performance and risk by diversifying geographically. The international business literature provides evidence of the link between learning and performance and deductively also to risk (Baker and Sinkula, 1999; Lages et al., 2008). The exporting activity generates different capacities such as knowledge about international markets which have significant performance and risk implications on firms. This process is called in the literature “learning by exporting” or “learning through exporting”. Thus, there is evidence that learning through exporting experience can help firms by developing capabilities to pursue more comprehensive international expansion strategies. Nevertheless, empirical evidence regarding the hypothesis of “learning by exporting” is inconclusive (Aw et al., 2000; Bernard and Jensen, 1999; Clerides et al., 1998; Delgado et al., 2002; Hitt et al., 1997; Pavcnik, 2002; Salomon and Jin, 2008; Salomon and Shaver, 2005).

Different authors confirm the hypothesis of “learning by exporting”. Lages et al. (2008) apply a learning perspective to the study of export performance. They found a positive relation between organizational learning and export performance. Organizational learning enables firms with a constant improvement of their existing business model and it permits to innovate by developing new industry business models (Atuahene-Gima and Murray, 2007; Lages et al., 2009). Barkema and Vermeulen (1998) claim that firms learn how to manage international operations with the progress of time. Thomas and Eden (2004) argue that the benefits as well as the costs of being geographically diversified can have different impacts in the short and again others in the long term. Therefore, R&D investments have a negative impact on short-run performance and risk. The reason for this is that expenses of R&D investments incur contemporary while the anticipated benefits are generally reflected in long-run performance. On the other hand, Luo (1998) and Mascarenhas (1992) argue that internationalization at an earlier stage imply higher initial costs and reduces short-term financial performance. However, in general they gain higher market shares than latecomers.

In the same way, Kim et al. (1993) as well as Zahra et al. (2000) indicate that the geographic diversity of firms might cause higher learning opportunities. Firms are able to leverage learning across different markets and develop more diverse capabilities than are available to purely

domestic firms. Thus, internationalization enhances the opportunity to gain additional experience and knowledge which in turn increases the performance, decreases the risk and leads to competitive advantages. Reason is the fast adaptation to consumer preferences and the ability to innovate and maintain high-quality products (Harrison et al., 2000; Fernandez and Diez-Vial, 2015).

The new international trade perspective proposes that the existence of sunk costs, which are necessary to initiate the export activity are generating different capacities as knowledge about international markets which also have significant performance implications (Melitz, 2003). The most important resource which is required for SMEs successful market entry is consequently information and knowledge about the target market. This knowledge provides SMEs with competitive advantage. A firm that has an ample amount of information, is facing less uncertainty than comparable firms with a lesser amount of knowledge (Liesch and Knight, 1999). Nakos and Brouthers (2002) presented the importance of firm knowledge as well. Their findings indicate, that one of the most significant factors of SME entry mode choice is the innovativeness of a firm's product or service. Other researchers like Belderbos (2003) also claim, that entry mode has a major impact on R&D activities. Eaton et al. (2004) as well as Roberts and Tybout (1997) obtain evidence that confirms the existence of sunk costs for starting the export activity. The mentioned process which is associated with sunk costs is therefore called "learning by exporting" and as already explained, it has impact on productivity and risk of exporting firms (Clerides et al., 1998).

Consequently, learning by exporting indicates that firms increase their productivity by entering foreign markets (Clerides et al., 1998). Nevertheless, the evidence on learning by exporting is mixed and far from conclusive. None of the researches could find any significance of post-entry productivity changes (Wagner, 2002; Arnold and Hussinger, 2005). Other researchers could find any evidence, but the results differ in the time span and extent of productivity changes (Girma et al., 2004; De Loecker, 2010).

Hitt et al. (1997) in turn argue that costs of internationalization may increase over time. The reason for this is that the complexity rises and therefore the firm's operating costs in general. One example is that the firm has to adopt more sophisticated control mechanisms and organizational designs (Hitt et al., 1997). Pangarkar (2008) resulted also from his empirical study that the decision to internationalize aggressively affects the performance.

Sharma and Blomstermo (2003) claim that the basic assumption in the internationalization process theory is that knowledge accumulation is continuous and dependent upon the duration of foreign operations. Firms gradually build a knowledge base through operating in foreign markets. They learn from past experience by transforming this experience to useful knowledge. Thus, the longer the firms are involved in foreign operations, the more knowledge they are able to accumulate about such operations. Between knowledge accumulation and risk exist a relationship. The more knowledge a firm has accumulated, the less uncertain they perceive the foreign market to be. Consequently, with the progress of knowledge accumulation in export processes, the risk diminishes. In addition, firms with lower knowledge about foreign markets, tend to overestimate risks (Jansson and Sandberg, 2008).

The speed of the internationalization process is a further important issue to examine when analyzing the time and the learning by exporting subject. It refers to the dynamic part of the internationalization process, more precise, the time it takes to reach a certain degree of international operations and the consequences of the speed at which firms spread their operations internationally. It is important to analyze the time to enter the first foreign market, how quickly the firm enters more than one market, and how quickly it spreads international operations (Hilmersson, 2013). Hilmersson (2013) measures the speed of internationalization as the division of the number of markets entered, by the time taken to cover this distance. This measure accounts for the average number of markets entered for each time unit. He concluded, that firms are able to achieve advantages over competitors and establish first-mover benefits by internationalizing at a high speed. This leads to positive performance effects from international operations, especially in times of economic downturn. Thus, firms experience positive performance effects by internationalize quickly or aggressively, but a continued internationalization at a high speed is important for the sustainable positive performance effect and to spread the risks among different country markets rapidly (Hilmersson, 2013).

In accordance with the previous arguments, SMEs should internationalize aggressively to enhance their performance and consequently to reduce the risk. However, this deduction is in compliance with several different other researchers. Oviatt and McDougall (1994; 1999) argue that some firms pursue internationalization at an early stage of development by deploying an innovative set of strategies such as extensive usage of alliances. Nevertheless, it has to be mentioned, that empirical results and authors argumentations are not completely consistent in this stream of literature. Thomas and Eden (2004) argue, that the benefits are more likely to

occur in long run, relative to the costs. Melitz (2003) claims, that firms have to reach a minimum productivity level, in order to start the exporting activity. Even though the time dimension is not clear in the previous literature, it results as important to consider the time aspect. Thus, the internationalization-performance relationship has a time dimension.

Environmental issues have to be observed as well at this point. The environmental volatility is in general a time function for exogenous as well as endogenous reasons, which are related to the speed of firm's learning. As already mentioned, firm's learning consists of acquiring knowledge for the future. When the capabilities of the firm grow over time, it achieves greater control over the environment and consequently less uncertainty. Furthermore, depending on how the underlying investment opportunity progresses, the best alternative should be chosen to undertake the option (Cox and Rubinstein, 1985; Bowman and Hurry, 1993).

In this context, Johanson and Vahlne (1977) propose that the risk is the result of two factors which are resource commitment and uncertainty. In such way, the two uncertainty levels are identified which are endogenous and exogenous. In contrast to the endogenous uncertainty, the exogenous uncertainty can be less controlled by the firm. The reason for this is that the exogenous uncertainty exists, independent of the firm's action. The endogenous uncertainty in contrast can be influenced by a firm (Roberts and Weitzmann, 1981; Chi and Seth, 2002; Cuypers and Martin, 2010; Song et al., 2015). Consequently, the exogenous uncertainty can be named as the key driver of the value of real option investments. Among the exogenous uncertainties, three types are predominantly identified in previous research. These are country-level uncertainty, exchange rate uncertainty and demand uncertainty. The resource commitment for the international activity provides experiential learning and reduces the level of internal uncertainty (Johanson and Vahlne, 1977; Figueira de Lemos et al., 2010).

The learning by exporting hypothesis can also be observed from the perspective of operative flexibility. Referring to this, the knowledge creation is essential in the management of real options. Without the mentioned investments, opportunities cannot be realized that arise due to unanticipated changes in exchange rates, economic conditions, or consumer demand. Thus, the investing firm gains preferential access to opportunities in comparison to competitors without such investments in an exporting infrastructure. This permits a better risk management (Lee and Makhija, 2009).

The present section has reviewed the existent internationalization literature regarding the “learning by exporting” hypothesis. First the benefits and cost have been analyzed, as well as the impact on performance and risk. In this stream of literature, entry mode choices and the learning by exporting aspect, which indicates that exporting generates knowledge about international markets, are important. The findings in this section indicate that the speed and time dimension of internationalization has performance implications to a firm and furthermore it is able to reduce the risk because the internationalization accumulates knowledge. Nevertheless, the results are inconclusive in this stream of literature.

2.4.3 Resource commitment and export mode

With the purpose of the establishment of an exporting infrastructure, firms are able to use direct as well as indirect methods. As already explained, exporting is considered the most common foreign market entry mode. Thus, the export development process and the exporting infrastructure of manufacturing and exporting firms is examined, rather than FDI. Nevertheless, not the entire exporting activity has significant performance or risk implication and is generating compulsively knowledge. It is dependent on the chosen entry mode and resource commitment. Referring to this, the present section deals with the establishment and analysis of a direct as well as indirect exporting infrastructure and the needed resource commitment of the different entry modes.

Export development process can be divided into pre-engagement, initial, and advanced phase. The pre-engagement phase refers to firms, selling their goods only in domestic markets, those seriously considering export activity, and those that used export activity only in the past. The initial phase refers to firms involved in sporadic export activities. Lastly, the advanced phase refers to firms that are regular exporters. The majority of the models perceive the firm’s involvement in export operations as an evolutionary and sequential process. This can be ascribed to the interplay between the development of knowledge about foreign markets and operations, as well as the increasing commitment of organizational resources (Johanson and Vahlne, 1977; Leonidas and Constantine, 1996).

From different theoretical perspectives is proposed, that the exporting activity requires a resource investment. Furthermore, it is likely to generate distinctive and essential capabilities to

improve the productivity as well as to lower the risk and to create real options which generate operative flexibility. Nevertheless, not all foreign entry modes are able to generate the same amount of knowledge. In this regard, Lu and Beamish (2001) and Nakos and Brouthers (2002) found that SME choice of entry mode in export activity affects the firm performance and consequently the risk as well.

The previous sections have demonstrated the heterogeneity of results in the internationalization-performance and internationalization-risk research. Fernandez and Diez-Vial (2015) argue, that the heterogeneous results in previous studies could be due to the pathway or rather the export development models that firms have followed in their individual internationalization process. Referring to this, internationalization pathway can be described as the used method and way, a firm undertakes the internationalization process (Kuivalainen et al., 2012). Johanson and Vahlne (1977) have been one of the first researchers that put emphasis on the internationalization process. They suggest that internationalization is a gradual process, where firm's continuing accumulation of experimental knowledge of foreign markets, reduces the psychic distance among countries and improves the information exchange between the firm and the foreign markets.

Lages et al. (2009) employed a RBV perspective to understand how a set of capabilities, thereunder organizational learning, influences product innovation and export performance. Firm's RBV is suggesting, that a firm is able to achieve competitive advantage, a better performance and reduced risk, if it possesses resources and capabilities that are difficult to imitate as well as valuable and rare (Tsai and Yang, 2012). Lages et al. (2009) defined different capability drivers of product strategy and performance, including organizational learning capabilities for innovation. This component includes the knowledge development, facilitating behavioral changes in order to enhance innovation (Sinkula et al., 1997; Lages et al., 2009). They found, that in order to increase firm performance, product innovation plays a major role.

The variable of uncertainty has to be included in the present part of literature review as well. As previously mentioned, uncertainty is higher in the initial stages of the export development process. This is because firms have limited knowledge regarding internationalization and overseas market characteristics. By achieving more experience abroad and obtaining more knowledge about foreign markets, the level of uncertainty diminishes (Leonidas and Constantine, 1996). Thus, firms are placed in a continuing learning process. In this regard, learning is

described as an incremental process and takes place by doing. The learning process is also applicable to exports. In detail, firms learn doing business in foreign markets (Clerides et al., 1998; Lages et al., 2008).

Foreign market entry mode is an important parameter when observing the export expansion process. In order to establish such an exporting infrastructure, firms can use direct as well as indirect methods. Foreign market entries in terms of exporting, take place directly with customers or indirectly through intermediaries. Direct relationships can be established between buyer and seller in the particular country. Indirect relationships in turn, involve an outside party, usually an intermediary such as an agent, dealer or distributor. SMEs generally have limited resources. Firms tend therefore first to start with agents, and then passing through sales companies to manufacturing companies (Johanson and Vahlne, 1977; Jansson and Sandberg, 2008). In this regard, firms have the opportunity to engage in foreign operations via indirect export methods, as the use of export merchants, trading companies and resident buyers. These methods require less resource compromise, because entry mode choice is affected by firm resources. Larger firms generally have greater levels of economic and managerial resources for investments in the host market of entry (Jansson and Sandberg, 2008). Even though this alternative of foreign market entry can be an adequate method for many small firms to engage in exporting, the research of indirect exporting in form of foreign sales through domestic organizations is comparatively unexplored in the present stream of literature (Leonidou et al., 2010). The direct export methods include overseas distributors, agents and sales branches. Firms also have the opportunity to use a combination of entry modes to enter in different foreign markets. In addition, they also can move in an inverse manner, which means from a direct to an indirect distribution method (Leonidas and Constantine, 1996).

The resource commitment for the exporting activity provides experiential learning and reduces the level of internal uncertainty (Johanson and Vahlne 1977; Figueira de Lemos et al., 2010). Thus, the exporting activity implies implicitly the resource commitment, even though of a smaller intensity than the foreign direct investment. It includes the production in firm's home country, and the sale in other markets. In order to engage in the exporting activity, firms have to invest in overseas relationships and the infrastructure necessary for selling their products abroad. Such investments in exporting activity include the building of relationships with distributors and partners in other countries. These relationships help the firm to share risks associated with market entry. Furthermore, it allows the firm to focus on its own core capabil-

ities and benefit from those of its partners. In this way, risks of adverse outcomes will be reduced (Lee and Makhija, 2009).

The commitment of required resources in order to launch and maintain the export activity is focused on market research, procurement of export licenses that involve governmental review processes, the development of a distribution network possibly facilitated through local distributors, training and machinery for adapting the product and contracting of specialized labor force. Regarding the Uppsala model, the mentioned commitment is the knowledge creator and it propitiates the risk reduction (Johanson and Vahlne, 1977; Figueira de Lemos et al., 2010).

Thus, regarding the mentioned facts, it can be assumed that the performance increases and the risk diminishes with the progress of the internationalization process because the knowledge increases and the uncertainty diminishes.

Foreign market entry mode choice determines the level of resource commitment, risk, and control that a firm undertakes in its foreign market activities (Anderson and Gatignon, 1986; Hill et al., 1990). Even though, different researchers have analyzed and discussed international entry mode selection, there exist only few empirical evidence, how entry mode choice will influence post-entry decisions as well as performance and risk (Brouthers and Bamossy, 2006; Canabal and White, 2008). Nonetheless, to change an initially chosen entry mode can be related with high costs and loss of time (Ganesh et al., 1997). Thus, beyond the positive effects, the wrong entry mode is able to impact negatively the firm's performance and risk (Lu and Beamish, 2001; Nakos and Brouthers, 2002).

In conclusion to the present section, it can be claimed that the issue of resource commitment in export activity has to be taken into consideration because it is able to reduce the strategic risk. The resource commitment is enabled with the capacity of knowledge generation which is named in the literature as "learning by exporting" and has the ability to improve performance and risk. The mentioned effect is named as the export mode effect and consequently implemented as the fourth hypothesis.

Thus, the fourth hypothesis is:

H4: Resource commitment in export activity reduces strategic risk (export mode effect)

In conclusion to chapter 2 it can be claimed, that the export activity is able to reduce firms strategic risk (hypothesis 1). This is the principal question the present empirical work aims to clarify. Then, the causes of this risk reduction capacity were analyzed. First it was identified that the export diversity is one cause (hypothesis 2), and the operational flexibility another cause for the risk reduction capacity of a firm (hypothesis 3). On this point, the resource commitment is another important element that has to be mentioned. The resource commitment has the ability of knowledge generation and improves consequently further the performance and risk (hypothesis 4).

In conclusion, the main contribution of the real options theory in international business is the perception that real options in form of sequential investments are able to create economic value through their inherent flexibility, especially under uncertainty and other environmental conditions (König, 2009). In response to different uncertainties, the theory gives emphasis to dynamic efficiency gains, downside risk reduction, and the ability to enhance upside opportunities over time by internationalization. Moreover, the higher the level of uncertainty, the higher the possible payoff to the option holder (Reuer and Tong, 2007).

The following section shows the conceptual framework and research hypotheses of the present work. In this regard, four hypotheses are implemented which will be tested in the subsequent sections.

2.5 A framework for the analysis of export and risk

Previous research has debated the relation between internationalization and performance, respectively risk. Referring to this, previous work is inconclusive regarding the relation between the internationalization-performance (Annavarjula and Beldona, 2000; Thomas and Eden, 2004; Pangarkar, 2008) as well as on the internationalization-risk relationship (Lee and Makhija, 2009; Elango, 2010). In addition, the major part of the literature is focused on large MNEs rather than on SMEs. While building on the ideas of previous evidence and their limitations on strategic risk, the institutional framework used in this study is explained in the following section, to better understand the intention, the measures and the methodology of the current analysis. Thus, the purpose of this section is to review the literature on the internationalization-performance and risk relationship discussed in previous sections and to build up

the conceptual framework, including the setting of the hypotheses needed for the further approach and progress of the present work. With regard to this, four different hypotheses are proposed which will be explained in the present section. The section ends with the outline of the conceptual framework and research hypotheses in order to understand them better and to develop a target-oriented approach of solution.

The main research question this paper deals with is the clarification of the effect that the export activity has on firm's performance and especially on risk. In this regard, the internationalization-performance relationship has already been one of the central issues in the international business literature. But, previous research is inconclusive regarding the research question (Annavarjula and Beldona, 2000). The existing evidence regarding the relation between internationalization and risk in particular, is inconclusive as well (Elango, 2010). The present work is consequently aimed at finding some clearer evidence with regard to this relationship. However, even though there are inconclusive results regarding the internationalization-risk relationship, it exists evidence that the exporting activity is a risk diversifying method by spreading the sales over different markets with different business cycle conditions or in a different phase of the product cycle. The export activity is in conclusion able to provide some opportunities and to substitute sales in the domestic market by sales in the foreign market, especially when the home market is impacted by a negative demand shock (Miller and Reuer, 1998; Wagner, 2012).

Thus, theoretical approach and empirical results indicate that an adequate internationalization strategy in form of exports is able to reduce the strategic risk. For this reason, hypothesis 1 is placed which is named as the export effect and claims consequently that the internationalization in form of the export activity reduces the strategic risk:

H1: Export activity reduces strategic risk (export effect)

The first sections provide an overview of the existing relationship between the export activity and strategic risk. After assuming that the export activity has the ability to reduce firm's risk, in a further step the reasons for this relationship have to be clarified. It is presumed that the export diversity influences the mentioned relationship. The work consequently goes on to the description of the relation between the export diversity or export diversification on perfor-

mance and strategic risk. In detail, it will be analyzed if differences in the export-performance and risk relationship does exist when using different target destinations or exporting to a different number of geographic areas (Thomas, 2006; Pangarkar, 2008). The mentioned issue is named by Johanson and Vahlne (1977) as the psychological distance between the home and the import country and shows the relative similarity between countries in a cluster. The psychological distance has consequently important strategic and risk implications for internationalized firms because it is able to reduce the costs due to similarities within such regions (transaction cost theory) (Williamson, 1985) and it facilitates the learning which in turn reduces the uncertainties (organizational learning theory) (Habib and Victor, 1991). Moreover, different authors demonstrate that higher international diversity increases the performance and reduces the risk. Choi (1989) found that the incorporation of markets with different economic cycles in comparison to the domestic market, should enable firms with a higher capacity for the risk reduction. Bellone et al. (2010) found that firms exporting worldwide have a higher productivity than firms exporting only within Europe. Goerzen and Baemisch (2003) made the conclusion that the firm will have a better performance and risk reduction, the more countries it is exporting to, because it will be more diversified.

As a result, numerous studies and different theories in the literature on export and performance as well as risk demonstrate that firms which are more diversified in terms of exporting to a higher number of foreign countries and/or to countries with a higher psychological distance have in average a better performance than firms exporting to a smaller number of foreign countries and to countries with a smaller psychological distance.

Based on this, the diversification effect is incorporated and will be analyzed in the following work. This means that after claiming that the export activity reduces the strategic risk, the export diversity is identified as one reason and accelerator of the mentioned effect. Thus, export diversification reduces strategic risk which will be tested with the second hypothesis:

H2: Export diversification reduces strategic risk (diversification effect)

Up to this point it was concluded that the export activity per se has a positive effect on performance and risk. In the second hypothesis, the export diversification was identified as one reason for firm's risk reduction through the export activity. Subsequent, the discussed issue is

viewed from the real options perspective, which in detail is the effect of export activity on operative flexibility and hence on performance and risk. It is supposed that the operative flexibility can also be named as a reason for the risk reduction through the export activity and act also as an accelerator in order to increase the risk reduction capacity.

It is supposed that firms which are enabled with knowledge and the infrastructure of exportation have two sources of flexibility. The first one is the arbitrage between markets and the second is the leverage. The arbitrage permits to reduce sales in negatively affected markets through the exchange risk, the country risk or a demand reduction and furthermore to increase it in markets, not affected by the mentioned risk or where the impact is lower (Roberts and Tybout, 1997). The leverage permits that the accumulated knowledge about several foreign markets facilitates the entry in new cultural, psychological, and institutional close markets (Johanson and Vahlne, 1977, Lu and Beamish, 2006).

In detail, the export activity generates operative flexibility through the enhanced upside potential and limited downside risk. The mentioned outcome is named in the present work as the real option effect and refers to firm's risk reduction through operational flexibility which is generated through the export activity. Beyond the diversification effect, it is the second explanation of the exporting-risk relationship. Consequently, the third hypothesis is:

H3: Operational flexibility generated through export activity reduces strategic risk (real option effect)

The last part of the theoretic framework deals with the resource commitment in export activity which is the export or also called entry mode a firm is using in internationalization process. With regard to this, entry mode is defined as an institutional arrangement, that allows firms to use their product or service in a country exchange or an institutional arrangement that enables the entry of firm's products, technology, human skills, management, or other resources into a foreign country (Root, 1987; Rasheed, 2005). It is important to choose the right export mode because it is related with a significant impact on performance and risk (Lu and Beamish, 2001).

The creation of international knowledge is an important resource which is required for SMEs successful market entry. It is consequently the information and knowledge about the target market which has to be taken into consideration in this part. Referring to this, Sharma and Blomstermo (2003) claim, that the basic assumption in the internationalization process theory is that knowledge accumulation is continuous and dependent upon the duration of foreign operations. Firms gradually build a knowledge base through operating in foreign markets. They learn from past experience by transforming this experience to useful knowledge. Thus, the longer the firms are involved in foreign operations, the more knowledge they are able to accumulate about such operations. Between knowledge accumulation and risk exist a relationship. The more knowledge a firm has accumulated, the less uncertain they perceive the foreign market to be. In addition, firms with lower knowledge about foreign markets, tend to overestimate risks (Jansson and Sandberg, 2008).

However, the capacity of generating foreign knowledge also depends on the resource commitment. It has to be distinguished between a direct and indirect establishment of an exporting infrastructure and also the required resource commitment of the different entry modes (Johanson and Vahlne, 1977; Leonardo et al., 2010).

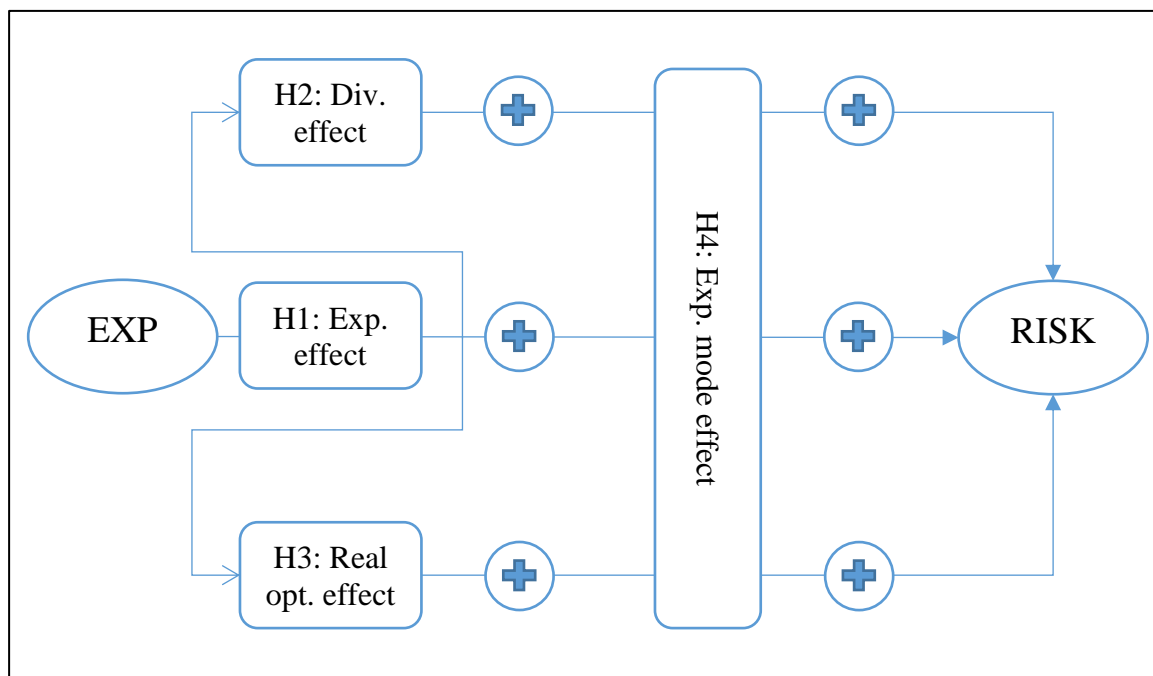
In order to establish such an exporting infrastructure, firms can consequently export directly to the customers or use indirect methods through intermediaries such as the use of export merchants, trading companies and resident buyers. Indirect methods require less resource compromise, because entry mode choice is affected by firm resources. As a result, the resource commitment for the exporting activity provides experiential learning and reduces the level of internal uncertainty, which in turn has the capacity for risk reduction (Johanson and Vahlne 1977; Figueira de Lemos et al., 2010).

Consequently, the hypothesis was made, that resource commitment in export activity reduces strategic risk. This is also called the export mode effect in the present work. Thus, the fourth and final hypothesis is:

H4: Resource commitment in export activity reduces strategic risk (export mode effect)

When dealing with resource commitment in export activity and the reduced strategic risk which results, the issue has to be related with the first three hypotheses. This is due to the fact that all hypotheses are affected by the resource commitment in export activity. It has been claimed that the exporting activity per se, the export diversity and the operational flexibility have a positive effect on strategic risk reduction. The resource commitment in export activity and the resulted export mode effect has impact on all of the previously three claimed hypotheses. It is a further and additional risk reduction power unit that improves the previously described effects according to the capacity of reducing the risk. In order to understand better the hypotheses and the resulted effects, in figure 8 the conceptual framework including the hypotheses is outlined and visualized. First, the export activity has a positive effect on risk by reducing it (H1). As reason are named the diversification effect (H2) and the real option effect (H3) which also influence risk positively. Finally, the export mode effect (H4) is integrated in the conceptual framework. It is the resource commitment as a knowledge generator that improves the hedging strategy and consequently influences the risk in a positive way as well.

Figure 8: Conceptual Framework and Research Hypotheses



Source: Own elaboration

3 Methodology, Sample and Variables

The third chapter presents the methodology of the analytical part of the present scientific work. It is the empirical application of the theoretical framework discussed in previous sections and it provides a description of the techniques and methods adopted in carrying out the collection of data in this study.

First, section 3.1 presents the quasi-experiment or also called pseudo-experiment methodology which permits to avoid the risk definition in terms of solving the problems which imply the appropriate risk definition for a group of SMEs. It is an important issue because the quasi experiment allows to analyze the behavior of a firm by using various flexibility options prior to a crisis period and control for the natural risk coverage.

Then, the present chapter incorporates the sample and the variables. In this regard, the literature is hampered by issues regarding the measure for the key dependent variables as performance, firm value and risk, but also by issues regarding the measure for the independent variables as degree of internationalization (Annavarjula and Beldona, 2000). Due to this, it is necessary to reflect the different measurement methods with its variables. For the measurement of internationalization, firm performance and internationalization's impact on performance and risk, different methods and variables are used. A broad reflection of the measures and variables as well as the illustration of the pros and cons enables an adequate selection of the methods and variables and therefore an adequate analysis. In section 3.2 the sample and data which is used is presented and explained. In section 3.3 follows the description of the variables which are divided into performance, internationalization and control variables.

Section 3.4 continues with the Difference-In-Difference analysis to make a causal inference on the productivity and strategic risk effect of exporting as well as export diversification and operational flexibility coming from real options for Spanish manufacturing SMEs. This section is important because this type of analysis allows for the fact that further variables and/or events confound the impact of interest. The section proceeds with a thresholds regression for the treatment of non-linearity. With the implementation of a threshold model it is consequently possible to observe estimates within different ranges of internationalization to prove if the non-linear regression leads to better results than the linear regression.

When using statistical analyses that are based on non-randomly selected samples, the problem of endogeneity and self-selection occurs. The utilization of a quasi-experiment and the Heckman procedure in section 3.6 is as a result important, because it solves the problem of endogeneity and self-selection. The model helps to avoid any potential bias and misspecification errors which are associated with the mentioned endogeneity problem. The chapter ends with the problem of cluster-robust inference, also called autocorrelation problem and the treatment of collinearity. In order to solve the potential problem of serial correlation, it is important to treat the problem of cluster-robust inference. In addition to the mentioned methodological problems in the present analysis, additionally the problem of collinearity can occur. The final chapter of the methodological part treats this problem whereby different criteria exist and are treated to detect the mentioned problem of collinearity.

3.1 A Quasi-experiment

With the objective to analyze if the operative flexibility which is generated through the exporting activity significantly reduces the firm risk, a pseudo-experiment will be realized. Primarily, the quasi-experiment methodology serves to circumvent the methodological problems which go together with the risk definition. In this regard, the risk definition can be avoided. Secondly, it permits to control a possible selection bias through the Heckman procedure. The quasi-experiment allows to analyze the behavior of the firm, with various flexibility options prior to a crisis period in a domestic market and to control natural risk coverage. The utilization of pseudo-experiments to realize this type of analysis has already been applied in previous empirical researches (e.g. Chung and Beamish, 2005; Lee and Makhija, 2009; Song et al., 2015).

In detail, the quasi-experiment approach uses the regulatory change of the interested variable as the treatment effect and allows the analysis of the same firm before and after the crisis. In order to implement the mentioned approach, the difference between the interested variable has to be calculated before and after the shock and for each firm affected by the shock or regulatory change. However, those variables which differ from the interested and observed variables can change as well. Consequently, another set of firms without the experience of a shock is used as a control group. In this way, the difference in the group that is affected by the crisis can be compared with the difference in the non-affected group over the same period. The

mentioned Difference-In-Difference analysis provides a robust environment for evaluating the cause and effect. The Difference-In-Difference analysis is further explained in section 3.4.1 (Reed et al., 2012).

In order to realize the mentioned pseudo-experiment, the following conditions are proposed in compliance with Lee and Makhija (2009). First, a substantial sample of firms is needed, that can be distinguished in their configuration of international investments which in the present case is the exporting status. The sample used in this study will be described in section 3.2 and is an adequate sample in order to conduct the analysis. Second, a definable moment is required when the rate of change shifts in a dramatically negative direction. This allows the comparison of periods reflecting economic stability and periods reflecting economic crisis. The present analysis uses the year 2009 as the definable moment because it is the relevant year of the economic and European crisis with the highest impact on the Spanish economy. Third, assessable ex-post performance outcomes are needed for the different ex-ante strategies, which also can be derived from the used data.

The effectiveness of the quasi-experiment approach depends on the exogeneity of the shock. Unexpected events, as in the present study the financial and economic European crisis, are able to provide an adequate test environment, especially when the shock and non-shock groups are similar alongside other firm characteristics (Reed et al., 2012). In this regard, the current global markets are enabled with a high level of uncertainty (Chung et al., 2013). As already mentioned, uncertainty can arise from diverse exogenous sources. Referring to this, previous researchers have mainly analyzed the exogenous uncertainty sources faced by firms, rather than the endogenous. They found that a significant change in the macroeconomic environment of several countries is an important source of uncertainty (Ahsan and Musteen, 2011). This research also puts emphasis on the exogenous uncertainty in form of an economic crisis, rather than on sources of uncertainty which are endogenous to a firm.

As already mentioned in previous sections, environmental turbulences refer to the rate and unpredictability of changes in firm's external environment (Danneels and Sethi, 2011; Hanvanich et al., 2006). In detail, environmental turbulences can be defined as technological and market changes within an industry (Tsai and Yang, 2012). Regarding to this, technological turbulences are defined as the rate of change in technology within an industry (Tsai et al., 2008; Tsai and Yang, 2012). Market turbulences in turn are defined as the degree of changes in customer preferences (Olson et al., 2005; Tsai and Yang, 2012).

Different researchers have already used such crisis periods to analyze performance and risk implications of internationalized firms. Lee and Makhija (2009) use the context of the Korean economic crisis that occurred in 1997 as a natural experiment approach. They analyze if firms flexibly accommodated the uncertainty when using their international investments. Therefore, based on real options theory, a firm that has invested in exporting has the possibility to allocate sales of its domestic production among the domestic as well as the foreign markets (Lee and Makhija, 2009). It can be supposed that firms that have invested in options in order to respond to uncertain futures, have the opportunity to engage uncertainty and benefit by the previously conducted investments (Reuer and Tong, 2007).

Thus, economic turbulences in form of a crisis can be named as one important source of exogenous uncertainty. With regard to this, Chung et al. (2013) claim that macroeconomic shocks are able to create unpredictable but fundamental shifts in the level of demand and the relative costs of inputs, causing a radically reconfigure of firm's operations in response to new opportunities. Zhao et al. (2015) claim that an economic crisis can provoke a total collapse of large financial institutions, including the housing market, prolonged unemployment, and a period of stock market downturns around the world.

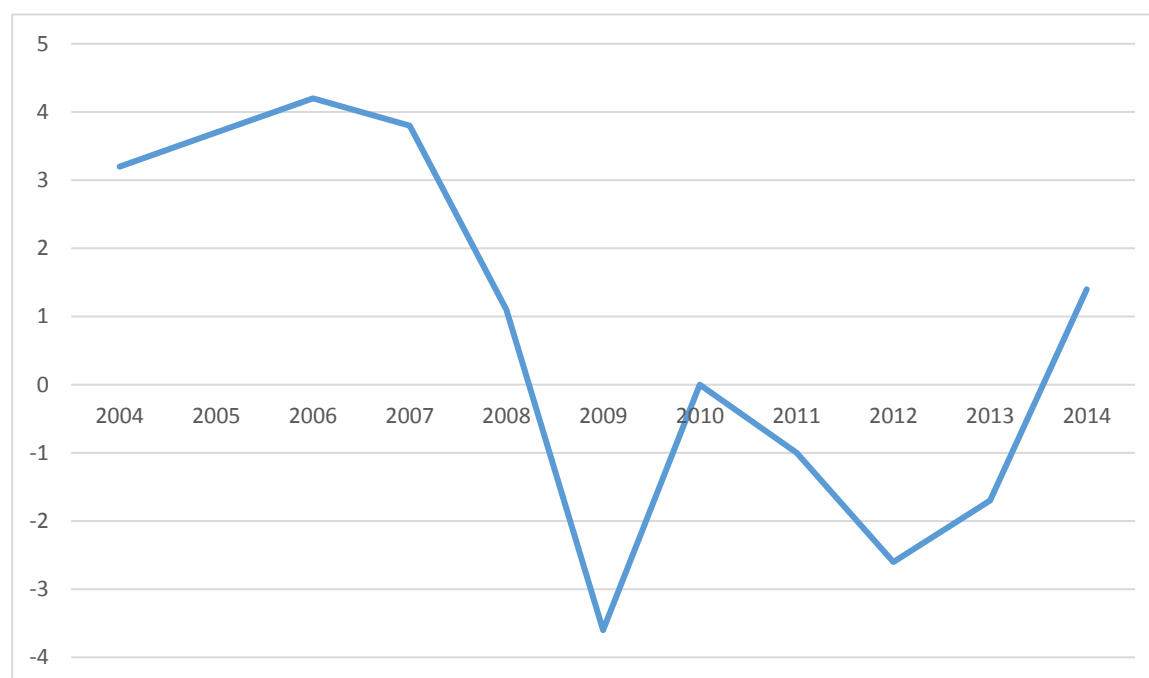
In the given literature evidence exist regarding the financial crisis from the year 2007, where the crisis has started. Thus, Zhao et al. (2015) found by using the financial crisis in 2007-2008, which is considered as one of the worst economic crisis since the great depression of the 1930s, that internationalized US-firms are able to use their operational flexibility, which is provided by their international investments, in order to adapt more rapidly to a market downturn and strategically relocating their sales, compared with their domestic competitors. They also found that international firms have experienced an increase in accounting performance after the crisis, which is not observed from domestic firms (Zhao et al., 2015).

Based on the same logic, which is presented in this section, the present work will use a quasi-experiment in the analytical part of the work. It will use the financial crisis in 2007, which resulted in intense changes in the external environment of firms. The global financial crisis started in 2007 in the US when financial institutions and firms collapsed and went bankrupt (Scott, 2010). Then, the crisis spread globally whereby the most affected countries in Europe were the countries from the European periphery, including Spain (Lane, 2012). It will be ana-

lyzed the differences in performance between the exporting and non-exporting firms, before and after the economic crisis which had the highest impact on the Spanish economy in 2009.

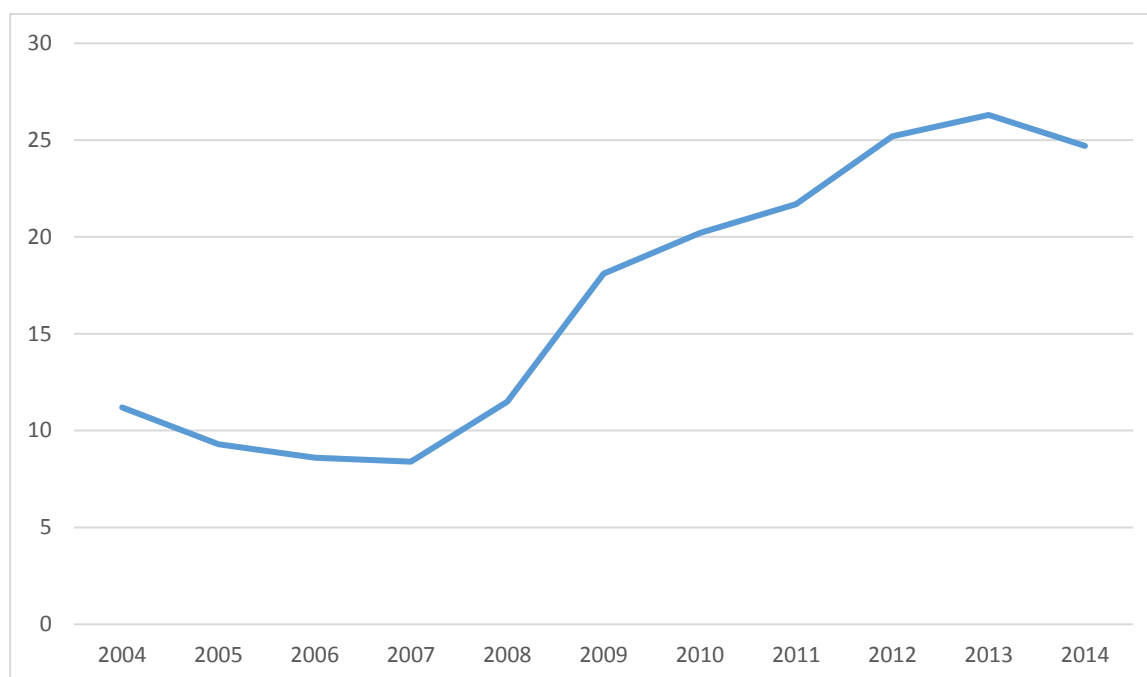
Figure 9 shows real GDP growth rates in percent of the Spanish economy in the years 2004 up until 2014. In the mentioned figure can be observed that since the start of the global financial crisis in 2007, GDP ratios have decreased sharply and the highest decrease was in the year 2009. In detail, as shown in figure 9, Spain's GDP rate dropped by nearly 6%. The growth rate had its highest drop and the highest negative rate of -3.6% in 2009. Figure 10 shows Spain's unemployment rates in the same period. In this figure, the same trend can be observed. Thus, from the beginning of the crisis the unemployment rate has increased sharply from 8.4% in 2007 up to a maximum of 26.3% in 2013. The highest yearly increase in unemployment was from 2008 to 2009. The unemployment rate increased by 6.6% from 11.5% to 18.1%. The two economic figures can be used as indicators that the crisis started in 2007 and had its highest impact in 2009. It can be further concluded that the European economic crisis provides a proper case to investigate firm's performance and risk fluctuations in times of economic downturn.

Figure 9: Real GDP growth rates of Spain - Annual (%)



Source: Eurostat 2016

Figure 10: Unemployment rates of Spain - Annual (%)



Source: Eurostat 2016

3.2 Sample

After describing the quasi-experiment method which solves the fundamental problem of causal Inference, controls for selection bias and avoids the risk definition, in the present section the sample will be described which is needed to perform the analysis. The sample and data used in the present work is received from a longitudinal study of Spanish manufacturing firms. The database also provides extensive annual information on firm-level characteristics. The mentioned study is called “Encuesta Sobre Estrategias Empresariales” (ESEE) and is directed by the “Fundacion Empresa Publica” with the financial support of the Spanish Ministry of Industry. The study started in 1990 with a sample initially of 2188 firms (Campa, 2004; Cassiman and Golovko, 2011). Since the beginning of the study, almost 1800 firms are surveyed yearly by using a questionnaire with 107 questions and 500 and more specific fields. The information is collected annually and is consistent with previous years. The sample of firms includes Spanish manufacturing firms with at least 10 employees and fewer than 250 employees. It attempts to maintain the representativeness of the manufacturing sector over time. Every year, newly created firms are added to the sample and firms that withdraw from

the original sample were replaced by firms with similar characteristics. The features of the mentioned dataset make it suitable to examine the determinants of firm internationalization and performance. Thus, the sample of data chosen from the ESEE dataset provides an adequate setting for analyzing the relationship between internationalization and performance as well as risk of firms. Primary, the data contains a representative sample of the entire population of Spanish manufacturing firms classified by industries and size. It includes exports and distribution by geographical areas and access channels to international markets and it furthermore provides essential data to calculate performance and risk. In addition, it provides information based on panel data, which implies the systematic tracking of changes in firm's legal status. In this regard, different researchers have already used this dataset to analyze the mentioned relationship. Among them are Esteve-Perez et al. (2007), Cassiman and Golovko (2011), Manjon et al. (2013), Farinas and Martin-Marcos (2010).³

In order to undertake the present analysis, a sample of 1.713 manufacturing Spanish firms has been selected. 947 firms have exported during the observed period between 2007 and 2011, whereby 766 cannot demonstrate any exporting activity during the mentioned period. The utilized SMEs have a size which is less than 250 employees because SMEs are commonly defined as firms with fewer than 250 employees (OECD, 2005).

3.3 Description of variables

After describing the sample and data used in the present work, the description of the variables will take place. In this regard, the variables are divided into three parts. First, dependent variables are described, consisting of performance and risk measurement. Then, the independent variables are explained, which in detail is the internationalization measurement. Finally, the used control variables are treated to control the heterogeneity.

³ More information regarding the ESEE data and its sampling properties are available at <http://www.fundacionsepi.es/esee/en/epresentacion.asp> (accessed on 05/04/2016).

3.3.1 Dependent variables

The objective of the present work is to analyze the effect of the export activity on performance respectively operative flexibility and especially strategic risk. Consequently, the important dependent variable to use and explain in this work is risk.

The risk identification and definition as well as the risk minimization techniques and strategies are treated as an important issue in the given literature on internationalization and SMEs. This is because strategic risk can have an important and negative impact on firm's performance. Thus, SMEs should engage effort in risk identification and analysis to manage risks from a diverse range of sources (Schultz, 2001). Especially in time of economic turbulences, the real options theory must be included when analyzing the internationalization-performance and the internationalization-risk relationship. Lee and Makhija (2009) claim that firms can circumvent lower performance in crisis periods by using real options in form of higher flexibility through internationalization. They found that internationalization provide firms with a coverage option and higher flexibility in such crisis periods, to limit the downside risk. Thus, firms can use their existing export investments to switch sales to new markets and to increase or rather to reduce sales in several markets. Without the initial investment in an exporting infrastructure it would be more difficult to identify new customers in these markets. The locating of new customers in new markets requires initial investments into market research and distributor relationships. Therefore, initial exporting investments allow firms to maintain high sales in times of an unanticipated economic crisis (Lee and Makhija, 2009). Even though, the extent and timing of any kind of crisis is difficult to predict, strategic flexibility allows a firm to be agile and flexible, which in result is a powerful tool for surviving such a crisis (Evans, 1991).

Consequently, to guarantee risk reduction through reduced negative impact of uncertainty and potential losses, firms need reliable risk measures. In detail, they need a method to measure the size of potential loss mechanisms to monitor and control positions and create incentives for careful risk takings and reduction (Fatemi and Glaum, 2000).

Thus, different methods for the measure and assessment of risk are existent in the literature. The quasi-experiment methodology which has already been covered in section 3.1, permits to avoid the definition of risk by solving the problems which involve an appropriate risk defini-

tion for a group of SMEs. In this regard, the quasi-experiment methodology serves first to avoid the methodological problems which are combined with the risk definition. Furthermore, it permits control for a selection bias through the Heckman procedure. In detail, it allows to analyze the behavior of the firm, with various flexibility options before a crisis period of a domestic market. It also allows consequently control for the natural risk coverage.

In order to perform the quasi-experiment, Cassiman and Golovko (2011) claim that ex-post performance outcomes are needed for the different ex-ante strategies. Referring to this, in the following section first the used performance measures in previous works are described. Then, the performance measure used in the present work will be described which in detail is productivity by means of Cassiman and Golovko (2011).

By observing empirical studies which analyze the internationalization and firm-performance, the difficulties of the selection of an appropriate measure of performance appear. One reason is that the availability of obligatory data represents a constraint for the feasibility of performance measures. Moreover, the effect of the internationalization degree, as the explanatory or independent variable, on firm-performance, as the explained or dependent variable, should be exposed separately (Stock and Watson, 2012). Furthermore, the performance term imposes “profitability” as well as “risk” of an undertaking, which has to be considered when analyzing firm’s performance in an internationalization process. Consequently, different profitability measures are presented in the following.

Regarding the key dependent variables as performance and firm value, many prior studies have been quite inconsistent in its usage. As previously described, prior studies have used a wide range of performance measures, which were not uniform. With this in mind, the mentioned measures can be distinguished between accounting-based measures and market-based measures (Kim et al., 1993; Lu and Beamish, 2004). The range of performance measures goes consequently from outcomes achieved in the product markets e.g. sales growth (e.g. Grant, 1987, Kim et al., 1989), to accounting measures e.g. Return on assets (ROA) which can be measured as the ratio between gross earnings and total assets (e.g. Gomes and Ramaswamy, 1999; Grant et al., 1988; Hitt et al., 1997) and return on sales (ROS) which can be measured as the ratio between gross earnings and a firm’s total sales (e.g. Kim et al., 1989; Tallman and Li, 1996). Both variables have been widely used in previous research, which is interested in assessing the potential effect of firm’s resources on the achievement of sustainable competi-

tive advantage. A further used variable in previous works is return on equity (ROE) (e.g. Grant, 1987, Riahi-Belkaoui, 1998; Shaked, 1986). Hilmersson (2013) measures the firm performance objectively by using firm's return on total assets (ROTA). Market-based measures also exist e.g. Risk-adjusted returns (e.g. Buhner, 1987; Collins, 1990; Goerzen and Beamish, 2003; Michel and Shaked, 1986). The presented broad range of performance measures were all used in prior studies. But, observing the individual studies, it can be concluded that every study has focused on one or two single measures and not on a cluster of different measures. The usage of one or two individual measures can be problematic. In this regard, one singular performance measure may not represent the firm performance in an appropriate level. This is essential when the objective function of the firm is broad (Goerzen and Beamish, 2003; Kennelly and Lewis, 2002). For example, different SMEs that are situated in an early stage of their evolution, might place a strong focus on sales growth. An analytical focus on their profitability might diminish the true performance attained by these firms. In addition, this might also falsify the relationship between the degree of internationalization and performance.

Because of the problematic which occurs by using one or two single measures, Pangarkar (2008) deploys a composite measure. It is a perceptual multi-item subjective measure of performance. This measure has an aggregation bias and might be a more accurate indicator of performance. In addition, it could account for the complex set of goals that SMEs might have. Thus, Pangarkar (2008) deployed six items to assess performance which are: ROS, growth in sales, foreign profits, growth in profits, ROA, experience and knowledge gained from foreign operations⁴. He multiplied the score with respect to each dimension with the importance attached to it, to arrive at a single measure. It exists also further evidence in previous literature of using composite measures (e.g. Pangarkar, 2008; Carlsson et al., 2005; Child and Yan, 2003; Florin et al., 2003).

As already mentioned, previous works using performance measures in internationalization-performance analysis, have utilized rather MNEs than SMEs. Since the emphasis of the recent scientific work is on SMEs, the usual methods and models which are proposed in the literature are difficult to implement for SMEs. Many of the market based measures used in prior

⁴ Pangarkar (2008) uses the variable experience and knowledge gained from foreign operations as an average score for knowledge regarding international business practices. In this regard, knowledge is generally derived from management's foreign placements since a majority of SMEs in the sample reported that their management makes five foreign trips and more per year.

studies cannot be applied to SMEs because these firms are in comparison with MNEs, generally not listed on stock exchanges. Examples for such measures that cannot be used in the present analysis are Jensen's alpha or Tobin's q (Pangarkar, 2008).

Up to this point a general overview was given of the commonly used performance variables. Different performance measures will be used in the present scientific work. Thus, during the further section, the performance variable which is used in the present work will be accurately explained and discussed. Consequently, the mechanism that the present scientific work aims to test, implies a direction of causality which runs from productivity to the final decision of a firm to export. Thus, the dependent variable is productivity which is used as a proxy of performance. To measure the firm productivity, it will be used the total factor productivity (TFP) estimated at firm level, as defined by Cassiman and Golovko (2011) and based on Delgado et al. (2002) as well as on Syverson (2010). In addition, the growth in total factor productivity (GTFP) will be used as well.

Foster et al. (2008) claim that productivity is only one of several factors that determines firm's profit. In this regard, firm success and survival depends on profitability. Profitability is used as a positive monotonic function of productivity in theoretical models of market selection as well as in empirical studies on firm entry and exit. The selection on profits is consequently in this case equal to the selection on productivity. Thus, there exist data sets that are appropriate to allow the measurement of productivity to obtain a substitute for profitability (Wagner, 2012). In the case of the present work, the ESEE, as already mentioned, enables adequate data about the input and output variables at the firm level that are obligatory for the productivity or rather the TFP measurement.

One advantage of the TFP measurement is that the parameters of the production function do not have to be estimated to compute productivity (Delgado et al., 2002). Consequently, the mentioned productivity measurement method is offering the robustness of being a nonparametric first-order approximation to a general production function (Syverson, 2010; Cassiman and Golovko, 2011). A further benefit of the mentioned measurement method is that productivity and sales growth can be considered to a certain extent as better measurement methods of firm performance than accounting-based measures. One reason is that this measurement type may be subject to manipulation by the management. This conclusion is in accordance with different previous researchers as Carton and Hofer (2006) as well as Miller et al. (2007)

and Foster et al. (2008). The index measures of productivity are therefore a suitable method for the present type of analysis (Syverson, 2010; Cassiman and Golovko, 2011).

The TFP index used in the present work was developed by Caves et al. (1982) and further extended by Good et al. (1997). The used method of computing the TFP index is also similar to used measures in current works (e.g. Aw et al., 2000; Aw et al., 2007; Delgado et al., 2002 and Cassiman and Golovko, 2011). Therefore, the following is based on these previous researchers which delineated and described how the TFP index and the TFP measurement method is calculated and used. The final index is then computed as each firm's input and output deviations from a reference firm. This means that each firm's output, input and productivity are measured relative to the mentioned hypothetical firm in the same industry for each year. In this regard, the reference firm means a hypothetical average firm that varies across industries. Furthermore, for a given industry r , the reference firm is defined as its output is equal to the geometric mean of firms output quantities in industry r over the complete period. Then, the quantities of inputs are equal to the geometric means of firms input quantities in industry r over the whole period. And finally, the cost shares of inputs are the same as the arithmetic mean of firms cost shares in industry r over the whole period. When observations of different industries are pooled, productivity differences among industries are removed because the reference firm varies across industries, as already mentioned (Delgado et al., 2002).

The index is calculated as the logarithm of firm's output minus a cost-weighted sum of the logarithms of the three inputs, which are labor, capital and raw materials in the production process. The TFP index reflects in conclusion all factors which are not particularly used, thus others than labor, capital and raw materials, but which belong to firm's output and can lead to profit differences across firms (Syverson, 2010; Cassiman and Golovko, 2011). In detail, the TFP index for firm i ($i = 1, \dots, N$) from industry r ($r = 1, \dots, R$) in year t ($t = 1, \dots, T$) is computed by using the following formula:

$$\ln TFP_{i,t,r} = \ln Y_{i,t,r} - \ln \bar{Y}_r - \sum_{j=1}^J \frac{1}{2} (S_{i,t,r,j} + \bar{S}_{r,j}) (\ln X_{i,t,r,j} - \ln \bar{X}_{r,j}) \quad (1)$$

Where:

$Y_{i,t,r}$ is the output of firm i and industry r in year t . $X_{i,t,r,j}$ is an input j ($j = 1, J$) of firm i in year t , where the input is composed of labor, capital and material input; $S_{i,t,r,j}$ is a cost-based share of input j of a firm i in year t and industry r ; and

$$\ln \bar{Y}_r = \sum_{i=1}^N \sum_{t=1}^T \ln Y_{i,t,r} \quad (2)$$

and

$$\ln \bar{X}_{r,j} = \frac{1}{NT} \sum_{i=1}^N \sum_{t=1}^T \ln X_{i,t,r} \quad (3)$$

and

$$\bar{S}_r = \frac{1}{NT} \sum_{i=1}^N \sum_{t=1}^T \frac{1}{2} S_{i,t,r} \quad (4)$$

denote the same variables for the reference firm. Thus, the dash above the variables indicates that the mentioned variables belong to the reference firm. The growth rate of the TFP is denoted as GTFP. Consequently, the utilized dependent variables are TFP and growth in total factor productivity (GTFP). It can be concluded that firms with positive residuals are relatively more productive while firms with negative residuals are relatively less productive.

As previously mentioned, output and input variables are needed to measure TFP at the firm level. Each firm is therefore modeled as using three inputs in its production function that are labor, capital and material input. The labor input is measured as the number of total effective working hours per year. The measure of capital input is the capital stock, calculated using the formula:

$$K_t = I_t + K_{t-1}(1 - d_t) \frac{P_t}{P_{t-1}} \quad (5)$$

where I_t represents investment in equipment in year t , d_t the depreciation rates in year t , and P_t the price indexes for equipment in year t . The information on depreciation rates, price indexes for equipment, producer price index and consumer price index is taken from the Instituto Nacional de Estadística de España.⁵ The consumer price index is used as the deflation factor for the individual years.

The material input includes raw materials, fuel and electricity costs, and other services bought by a firm. Firm output is defined as total firm sales deflated by a producer price index at the two digits NACE industry level (Caves et al., 1982; Good et al., 1997; Delgado et al., 2002; Cassiman and Golovko, 2011).

As already explained, this work analyzes the effect of the export activity on firm's strategic risk. However, various problems associated with the measurement of risk does exist. The present work uses a quasi-experiment to avoid the risk measure. In order to perform the quasi-experiment, ex-post performance outcomes are needed for the different ex-ante strategies. The performance measures are calculated as the total factor productivity, as explained in the present chapter. The subsequent chapter continues with the explanation of the independent variables.

3.3.2 Independent variables

The measurement of firm internationalization has gained essential importance in the literature on internationalization performance and risk relationship. The reason for any firm's degree of internationalization measurement is its ability to explain significant causes and consequences of firm's international expansion (Hassel et al., 2003). With this in mind, different studies have underlined the importance of internationalization and the export destination choices in strategic decisions and how they might influence the performance of firms (e.g. Goerzen and Beamish, 2003; Pangarkar and Hussain, 2013). Nevertheless, an official or uniform structuring system for internationalization and geographic dimensions has not been detected in the literature. Moreover, there is no consensus for the measurement of internationalization or the degree of internationalization (Hsu and Boggs, 2003).

⁵ More information regarding the INE data are available at <http://www.ine.es> (accessed on 10/04/2016).

The internationalization term has different implications, even though it is restricted to firm internationalization. Thus, some researchers might define the term of internationalization as a process. Others in turn define it as a certain degree of international involvement, reached by a firm (Dörrenbächer, 2000).

In order to measure internationalization, different methods and variables exist, whereby none of the single measures lead to a totally satisfactory outcome (Fisch and Oesterle, 2003). To measure the degree of internationalization, Grant (1987) argues that it is obligatory to find a proxy that reflects the relative size and strategic importance of domestic and overseas operations. In the following, the different methods used in prior studies for determining the independent variable of internationalization will be presented.

Hassel et al. (2003) argue that two dimensions of internationalization exist. The first refers to the production activities of firms abroad. The second refers to the financial or rather corporate governance dimension of firms. Hsu and Boggs (2003) use comparable dimensions of internationalization. They argue that the financial and the geographical dimension conceptualize internationalization. They use as example of the financial dimension revenues and as example of the geographical dimension the number of countries where the firm operates.

Hendrik and Oeserle (2003) in turn differentiate between uni- and multidimensional measurement methods. Other researchers in turn e.g. Ramaswamy et al. (1996) only found little support for multidimensional measures. Nevertheless, in the following first the existing unidimensional measurement methods are explained. In this regard, the unidimensional measures can be divided further into relative and absolute measurement methods. The relative internationalization measures detected in the literature have similar advantages and disadvantages. They are constructed by an average term of the foreign share in sales, profits, assets, employment and offices (Hassel et al., 2003; Contractor et al., 2003).

Foreign Sales as a percentage of Total Sales (FSTS)

The FSTS is the first unidimensional measurement method and one of the most frequently used methods. It is used as a proxy for firm's dependence on its overseas markets for sales revenues (Gomes and Ramaswamy, 1999). Consequently, many prior studies have been quite

consistent in its usage of proportion of foreign sales as a measure of internationalization (e.g. Collins, 1990; Sullivan, 1994; Nguyen and Cosset, 1995; Sambharya, 1995; Qian, 1996; Thomas and Eden, 2004).

$$FSTS = \text{Foreign Sales} / \text{Total sales} \quad (6)$$

FSTS measures the ratio of the home country business operations as a proportion of the total business and reasons deductive to the degree of internationalization and is also named as the foreign market penetration (Thomas and Eden, 2004). The heterogeneous foreign segments are added, so finally there result only two carriers that are distinguished. The simplicity and the low data requirements are the benefits of the recent method. The disadvantage is that through the data aggregation, an important part of the information is lost. Neither the total amount nor the relative weight or importance nor the relatedness of the economic areas is incorporated in the FSTS (Fisch and Oesterle, 2003).

Foreign Profits as a Percentage of Total Profit (FPTP)

FPTP is a similar method to the previously mentioned and faces consequently similar benefits and disadvantages. It has been used for the measurement of the performance attributes of internationalization (Hit et al., 2006). Consequently, for want of validity, the measure is only a rough proxy for the degree of internationalization of a firm. The main problem that occurs by using the FSTS measure is that it ignores the dispersion of foreign sales across markets. This has important consequences for performance (Pangarkar, 2008). Consequently, there are different alternatives to measure the geographic diversification that deal with this problem.

$$FPTP = \text{Foreign profits} / \text{Total profits} \quad (7)$$

An example from Preece et al. (1998) could clarify the weakness of the FSTS and FFTP. Assuming two firms that derive half of their sales from foreign markets, each will have a FSTS ratio of 50%. Firm A might negotiate with one single foreign market and firm B with 10 different markets. Preece et al. (1998) submit that due to the limited market presence and consequent lack of diversity, firm A may be missing out on several key benefits of internationalization. On the other hand, due to uncorrelated economic cycles in the different countries, firm B may enjoy smoother sales and profits. Furthermore, due to the diversity in the environment, firm B might have better learning opportunities and there may be possibilities to leverage the learning across multiple markets and thus enhanced performance (Preece et al., 1998; Pangarkar, 2008).

Foreign Assets as a percentage of Total Assets (FATA)

A further measure of internationalization is the ratio of foreign assets over total assets which are also named as the foreign production presence. It is also a relative measure and provides a measure of firm's dependence on overseas production (Gomes and Ramaswamy, 1999; Thomas and Eden, 2004).

$$FATA = \text{Foreign assets} / \text{Total assets} \quad (8)$$

Foreign Employees as a percentage of Total Employees (FETE)

Another relative measurement method is the ratio of employees in foreign locations to total employees which in detail is the number of foreign employees in a host country as a percentage of total employees. It is also used as an adequate method to measure the internationalization, since a higher spread of employees across different countries demonstrates that a firm is more internationalized or even in a later stage of internationalization (Kim et al., 1989; Hassel et al., 2003).

$$FETE = \text{Foreign employees/Total employees} \quad (9)$$

Foreign offices as a percentage of total offices (FOTO)

Another often used alternative for the internationalization is the ratio of foreign located offices to total offices. It is a similar method to the previously mentioned relative and unidimensional ones (Contractor et al., 2003).

$$FOTO = \text{Foreign offices/Total offices} \quad (10)$$

Degree of internationalization (DOI)

Pangarkar (2008) developed a further measurement of the internationalization and argued that it is a more appropriate method than the previously mentioned. He presumes that conventional methods lack validity and tries to overcome the detected disadvantages. His developed measurement method considers the dispersion in foreign sales. He also distinguishes between the markets, either in terms of the importance or penetration of the market. Referring to this, the measure is separated into two different parts. The first measure is a combination of the traditional proportion of foreign sales variable and the dispersion of foreign sales across geographic regions. Thus, he modifies the traditional FSTS by dividing it with squares of proportions of foreign sales coming from different geographic regions. The equation is computed as follows:

$$DOI1 = \frac{\text{proportion of foreign sales}}{(\text{proportion of sales in SE Asia})^2 + (\text{proportion of sales in rest of Asia})^2 + (\text{proportion of sales in Europe})^2 + (\text{proportion of sales in America})^2 + (\text{proportion of sales in rest of the world})^2} \quad (11)$$

Pangarkar (2008) employs an alternative measure, called DOI2. This measure is based on the psychic distance and location perspectives. Referring to the psychic distance perspective, Johanson and Vahlne (1977) propose that firms entering new markets face uncertainty. They will try to gain knowledge about the new markets for minimizing the uncertainty. But, psychic distance can have positive as well as negative impacts on the performance of firms. Referring to this, Pangarkar (2008) presumes that the positive effect of operating in psychically distant countries will outweigh the challenges due to operating in these distant countries. It can be deduced consequently that firm's which are operating in psychically distant countries should be enabled with better performance than firms whose portfolio consists of mostly psychically similar markets.

For calculating the DOI2, Pangarkar (2008) arranged the different geographic regions in ascending order, from the lowest psychic distance to the largest one. As his analysis is based on 94 SMEs in Singapore, the geographic regions are ordered as follows: SE Asian countries other than Singapore, Asian countries outside SE Asia and the rest of the world.⁶

$$DOI2 = \frac{(1 * \% \text{ of sales from SE Asia}) + (2 * \% \text{ of sales from the rest of Asia}) + (3 * \% \text{ of sales from the rest of the world})}{3} \quad (12)$$

Absolute unidimensional measurement methods

Beyond the relative unidimensional measurement methods, there also exist absolute unidimensional measurement methods. The first alternative involves *absolute foreign sales (AFS)* which refers to the sum of all sales abroad (Quian et al., 2008). Other researchers in turn measure the scope of expansion abroad. Thus, the second absolute unidimensional measurement method is dispersion or also called breath. It reflects the geographic dispersion of operations across countries which in detail refers to the total number of foreign operations (Hit et al., 2006). Beyond the ratio of foreign located offices to total offices, the count of the *number*

⁶ As the geographic classification is related to the geographic proximity of the countries or regions, the clustering is logically different for Spanish firms.

of foreign markets or foreign ventures is a further possible measure which belongs to the absolute measures (e.g. Delios and Beamish, 1999; Lu and Beamish, 2001; Ramaswamy, 1995).

Thomas and Eden (2004) argue that these kinds of measurement methods may be more important determinants of performance than the traditional relative depth measures e.g. the previously mentioned FSTS and FFTP. However, these absolute unidimensional measurement methods only partially address the issue. Counting the number of markets does not ignore the dispersion of foreign sales across markets as it ignores by the FSTS and FFTP method. The measurement problem that occurs by using these methods is that differentiation between the different markets does not exist. The differentiation happens neither in terms of the importance of the market, nor in terms of the distance of the market versus the home country. Thus, every market is treated in the same way, even if significant differences among different countries exists (Pangarkar, 2008).

Multidimensional measurement methods

So far, the unidimensional measurement methods have been explained. Nevertheless, evidence does exist of multidimensional measurement methods. This is another method to measure more than one dimension of internationalization. Among these researchers is Sullivan (1994), who defines the need for such measurement methods. He claims that firm's DOI has three attributes which are performance i.e. what goes on overseas, structural i.e. what resources are overseas and the third is attitudinal i.e. what is top management's international orientation. In this regard, the performance measure of internationalization is operationalized by five measures which are FSTS, advertising intensity (AI), research and development intensity (RDI), export sales as a percentage of total sales (ESTS), foreign profits as a percentage of total profit (FFTP). The structural attribute of DOI is operationalized by two measures which are FATA and overseas subsidiaries as a percentage of total subsidiaries (OSTS). The third attribute which is named as the attitudinal, is operationalized by measuring top managers international experience (TMIE) and the psychic dispersion of the international operations of a firm (PDIO). Sullivan (1994) measures finally the DOI with the linear combination of FSTS, FATA, OSTS, PDIO, and TMIE by reducing the error that results from sample, systematic, and random bias.

Consequently, multidimensional measures pick several unidimensional measures and try to cover a large and more representative range of internationalization (Fisch and Oesterle, 2003). Thus, beyond the unidimensional measurement methods, various studies combined different unidimensional methods as sales, assets, and employment to construct a multidimensional index (e.g. Gomes and Ramaswamy, 1999; Sullivan, 1994; Li and Quian, 2005).

In this section, different internationalization measures used in previous works have been explained and reviewed. Nevertheless, as already mentioned consensus for the utilization of some specific internationalization measurement does not exist (Hsu and Boggs, 2003). In the following, internationalization measurement variables, used in the present work are explained. In this regard, three different variables are used to measure different aspects of internationalization's effect on risk. The mentioned three variables correspond to the first three hypotheses. The first variable is the export status which corresponds to hypothesis 1. The second variable, corresponding to hypothesis 2, is export intensity. The third variable is growth in export, which effects the operational flexibility and corresponds to hypothesis 3.

Export status

One central independent variable in the present work is the export status of a firm i in time t ($EXP_{i,t}$), which analyses the export effect. Thus, exporters are defined as firms exporting in year t . This signifies that they display positive sales outside Spain. Non-exporters are defined as firms that did not report any exporting activity in year t . Deductively, the variable export is a dummy variable that equals one if a firm reports positive sales outside Spain in year t , and zero otherwise. It permits to differentiate between exporting and non-exporting firms. Thus, it is incorporated to analyze hypothesis 1, which is the export effect or in detail if the export activity per se reduces strategic risk. Regarding the first hypothesis, the status of an exporter should impact positively firm's performance and risk in crisis periods. All the separated interactions of main independent variables with the dummy variable were added to the regression model to examine the hypotheses.

Export intensity

The export effect includes beside the diversification effect, also the operational flexibility effect. Thus, first it will be analyzed if the condition of being an exporter influences productivity in crisis periods. Then, the reasons of the mentioned effect are analyzed which in detail are diversification and flexibility. Referring to this, first the diversification variable is presented. The second independent variable used in the present work is consequently the export intensity of firm i over time t ($El_{i,t}$), which analyses the diversification effect. It presents a measurement of the ratio between export and sales volume, which specifies the percentage of total sales derived from international markets. Referring to H2, which is the diversification effect, a higher export intensity should positively impact firm's performance and risk in crisis periods (Miesenbock, 1988; Preece et al., 1998; Thomas, 2006; Pangarkar, 2008)

Operational flexibility

A further independent or explanatory variable used in international business literature and in the present work is operational flexibility. It was already mentioned in previous sections that international investments in form of exportation have the ability to provide flexibility under uncertainty (e.g. Broll, 1999; Bowman and Hurry, 1993; Lee and Makhija, 2009). Consequently, beside the export effect and the diversification effect, the effect of export activity on operational flexibility is also analyzed. The flexibility associated with internationalization is as a result another independent variable that has to be taken into consideration, because the aim of this work is to measure the effect of internationalization and the resulted flexibility on performance and strategic risk.

In this regard, strategic flexibility is an unobservable variable but can be defined as firm's ability to respond quickly to market dynamic opportunities and threats by reallocating their resources properly and balancing internal as well as external environments effectively. Strategic flexibility represents a fundamental approach to manage uncertainty (Sanchez, 1993; 1995; Lee and Makhija, 2009). In conclusion, operational flexibility can be recognized as a coverage strategy and it enables a firm to gain competitive advantage in a turbulent market setting which indicates that in case of an economic downturn, firm's operational flexibility and readiness for unanticipated change is more beneficial than a unidirectional and steady

strategy (Broll, 1999; Lee and Makhija, 2009; Mello et al., 1995; Lee et al., 2006; Allen and Pantzalis, 1996; Reuer and Leiblein, 2000; Kogut, 1985; Kogut and Kulatilaka, 1994). Thus, it should be positively related with firm's performance and risk in crisis periods.

However, there are not many works that deal with this specific topic. Lee and Makhija (2009) is one of the few works analyzing strategic flexibility, gained through export-related investments during an economic crisis. With reference to this, flexibility of firm's exporting investments is described by the extent to which the firm is able to sell its products abroad to non-routine and new international customers. They use the following measurement method to proxy exporting flexibility:

$$\begin{aligned} \text{Operative flexibility} = & [\text{total exports} - \\ & (\text{exports to foreign subsidiaries} \\ & + \text{exports to significant and regular foreign customers})] \text{ (13)} \\ & / \text{total exports} \end{aligned}$$

In this research, strategic flexibility measures firm's capability to react quickly to an economic downturn. In order to measure the operative flexibility which is generated through the exporting activity, a pseudo-experiment will be realized. By using the quasi-experiment methodology, the methodological problems which go together with the risk definition can be circumvented. In detail, it allows to analyze firm's behavior, using various flexibility options prior to a crisis period to control for the natural risk coverage (Lee and Makhija, 2009; Song et al., 2015). However, a further and complete description and explanation of operational flexibility and the quasi experiment methodology was already given in chapter 3.1.

In order to measure the operative flexibility, a variable is incorporated as a proxy of flexibility options. The mentioned variable measures the realized changes in export activity. Exporting propensity was not used, so exportation growth can be caused by both, real growth in exportation and reduction of domestic sales. The execution of flexibility options in the present work are consequently measured by exportation growth of a firm i in time t ($GEX_{i,t}$).

3.3.3 Control variables

The possible effect on firm's productivity can be explained by the exporting activity or due to further variables that are likely to affect firm performance. This reality poses a causality problem. It is difficult to determine if further improvement of performance, flexibility and risk reduction in crisis periods is the result of the exporting activity or rather due to other variables and factors (Manjon et al., 2013). With the objective to isolate the value effects of internationalization from those stemming from other factors and consequently to control for heterogeneity, different control variables can be used and are included in the analysis. Thus, it must be controlled for other firm attributes to properly gauge the relation of interest. To facilitate the homogeneous comparison between exporting and non-exporting firms, a set of control variables will be consequently incorporated, that may exert significant effects on firm performance and risk. Furthermore, the introduction of these variables minimises the potential risk of omitted variable bias. Regarding this, prior researches generally use a couple of variables to isolate the impacts of internationalization on firm performance. The inclusion of control variables in the regression is a commonly used method to deal with the nonrandom nature of the treatment effect in each analysis. Consequently, it is important to include all other variables likely to affect performance and risk. Without the inclusion of control variables, problems such as the omission of some important variables, reverse causality and measurement error in the variables of interest can occur (Thomas and Eden, 2004; Reeb et al., 2012)

The specific control variables considered in the present empirical models are: *Firm Size*, *Capabilities*, *Firm age*, *Capital investments* and *Lagged productivity*. Industry dummies for each firm's primary industry are used to control for specific industry effects. To control for possible time effects, persistency and autocorrelation, the lagged values of the interested variables are included. It makes the model dynamic (Cassiman and Golovko, 2011). The mentioned variables are explained in the following.

Firm size

Firm size is commonly used in the literature as a proxy for competitive positioning within an industry and characterizes firm's financial as well as the physical resources (Lee et al, 2012). Relating to the size of the firm, Pangarkar (2008) suggests that due to greater resource availa-

bility, larger firms should exhibit a higher degree of internationalization and better performance. The higher degree of internationalization is explained by available managerial and financial resources while better performance is explained by economies of scale (Thomas and Eden, 2004). Firm size may also affect performance in a positive way because larger firms contain resources that can mitigate the effects of adverse environmental condition such as an economic crisis (Lee and Makhija, 2009). Tong and Reuer (2007) claim that firm size reflects how firms engage in international businesses and it shows the amount of slack resources a firm owns to survive under any financial challenges. Chang and Wang (2007) argue that especially SMEs, because of their size, have fewer resources to leverage when entering international markets and may derive fewer benefits from internationalization. Other empirical researchers did not find any relationship between firm size and degree of internationalization (e.g. Calof, 1994), while others in turn found a positive relationship between size and degree of geographic diversification (e.g. Miesenbock, 1988). Referring to Cassiman and Golovko (2011), firm size has a negative and significant effect on the productivity level.

It can be concluded that the relationship between firm size and performance as well as risk, is not empirically clarified because of contradicted results. However, some relationship between firm size and performance respectively risk does exist. Different authors use and assume this variable as an adequate variable to control for unobserved heterogeneity (e.g. Hitt et al., 1997; Chung et al., 2005; Chang and Wang, 2007; Pangarkar, 2008; 2013; Tong and Reuer, 2007; Lee and Makhija, 2009; Driouchi and Bennett, 2010; Cassiman and Golovko, 2011; Lee et al, 2012; Hilmersson, 2013; Song, 2013; Belderbos et al., 2014).

Different methods to measure firm size does exist in literature. In this regard, Hilmersson (2013) uses two variables related to the size of the firm. The first is the number of employees of the firm and the second is the total turnover of the firm. Firm's size (S) is measured in the present scientific work by taking the logarithm of the number of employees. Different authors as Cassiman and Golovko (2011) also used this measurement method to obtain firm size as a control variable. It is consequently an important control variable that can affect the dependent variable, and that has to be taken into consideration in the analysis.

Capabilities

Some researcher claim that an appropriate set of capabilities is necessary to get better performance and reduced risk in the internationalization process. Hence, firm's portfolio of capabilities can influence the performance (Melitz, 2003). Different researcher as Pangarkar (2008), consequently use capabilities as a further control variable when analyzing the internationalization-performance relationship. His argumentation for capabilities is based on Dunning (1973) as well as Oviatt and McDougall (1994). They argue, the stronger the capabilities of a firm, the higher will be the competitive advantage over local competitors and therefore the better their performance.

The previously mentioned capabilities are developed in different areas such as branding and marketing, technology development, financing and other areas useful for internationalization (Melitz, 2003). Thus, different areas and measures of capabilities exist. However, in the present work only two measures are used, technological intensity and advertising expenditures.

Technological intensity is one commonly used capability (e.g. Chang and Wang, 2007; Lee et al., 2012). R&D intensity captures a firm's endowment of individual technological knowledge. Consequently, it is a significant and important determinant of firm performance (Lee et al., 2012). Thomas and Eden (2004) and Lee et al. (2012) measure the technological intensity by its annual expenditures on R&D and divide it by average sales revenue.

Cassiman and Golovko (2011) in turn claim that successful product and process innovation leads to the decision by SMEs to enter the export market and furthermore, these two variables have a direct positive effect on productivity. In this regard, the mentioned two variables are incorporated in the present analysis and are explained in the following. *Product innovation (IPROD)*, is a dummy variable that equals to one if firm carried out product innovation at time t-1, and zero if the firm does not perform product innovation at time t-1. In detail, successful product innovation in a given year indicates that a firm has obtained new products, or products with new features that are different from those a firm has produced in previous years. *Process innovation (IPROC)*, is a dummy variable that equals to one if the firm carried out process innovation at time t-1, and zero if the firm does not perform process innovation at time t-1. In detail, successful process innovation in a given year indicates that a firm has introduced an important modification in the production process (Cassiman and Golovko, 2011).

Investments in R&D are a further measure of capabilities used in the present work. Different researchers already used R&D investments in order to control for unobserved heterogeneity and to take into consideration the impact of firm's intangible assets and capabilities on performance and risk (e.g. Delios and Beamish, 2001; Song, 2013). Song (2013) argues that firm's performance and consequently the risk should be related positively with R&D investments.

Technological intensity used as specific capabilities are defined in dependence of the industry. Thus, in the present work the effect of R&D intensity on performance and risk is measured and observed separately depending on the industry. This is because every industry has its individual intensity in R&D. In order to estimate the R&D intensity, depending on the individual industry, the method of De loecker (2007) is used. It is analyzed the effect within narrow defined industries. In this regard, the two-digit statistical classification of economic activities in the European Community (NACE 2 digit) is used to observe the individual industries. In this way, the effect across the various industries can be observed. The analysis at the 2-digit sector level enables a more disaggregated analysis. It is important to separate the analysis between the 2-digits, because the R&D intensity varies strongly among the different industries (De Loecker, 2007).

A further source of capabilities used in this work is advertising expenditures. Different authors claim that advertising expenditures are related with performance (Lee et al., 2012). Lee et al., 2012) claim, that AI is used in the literature as a proxy for consumer goodwill. They calculate it as the average of annual expenditure on adverting expenses, divided by sales revenue. It is expected that AI is as technological intensity, positively related with firm performance and risk. Thus, this variable will be used to control for unobserved heterogeneity as well.

Firm age

Some researchers use also the firm age to control for unobserved heterogeneity. They claim that firms gain experience and capabilities with the progress of time. The gained knowledge and capabilities in turn have a positive effect on performance and risk (Lee and Makhija, 2009; Lee et al., 2012). Firm age is consequently related to firm's experience and managerial

competences when doing business at home and abroad (Lee et al., 2012). Lee and Makhija (2009) claim furthermore that younger firms can be unable to develop a network of international investments. However, younger firms can also have some advantage over firms with a higher age because they reflect the agility of a more entrepreneurial or new firm. Therefore, firm age stands in relation to the level of managerial competences and experience that an organization has when doing business at home and abroad. Firm age is measured by the number of years the firm exists since its first year of operation. Thus, the difference between the current year and the firm's year of foundation (Lee et al., 2012). Even though, firm age can have a negative impact on performance and risk, a positive effect is expected because there are more benefits than costs (Lee and Makhija, 2009; Lee et al., 2012).

Capital investments

Increase in capital investment is a further utilized control variable which should be positively related with firm's performance and risk. Thus, the increase in capital investment is an appropriate control variable. Furthermore, it has influence in the export status of a firm. Exporting firms tend to be more capital intensive than domestic firms. It is for this reason that exporting firms remain active with a lower productivity shock compared to domestic firms (De Loecker, 2007).

Different alternatives to measure capital investments exist in literature. Boubakri and Cosset (1998) estimate capital investment by using two ratios. First, capital expenditures divided by sales. The second is capital expenditures divided by total assets. De Loecker (2007) defines the capital as the total fixed assets in book value. The Investment is calculated from the yearly observed capital stock in the following way with the appropriate depreciation rate (5%-20%) varying across industries, i.e.

$$I_{i,t} = K_{i,t} + 1 - (1 - \delta)K_{i,t} \quad (14)$$

Where:

- $I_{i,t}$: is the capital investment of firm i ($i = 1, 2, 3, \dots n$) in time t ;
- δ : is the appropriate depreciation rate varying across industries (5%-20%);
- $K_{i,t}$: is the capital input of firm i ($i = 1, 2, 3, \dots n$) in time t .

Consequently, if a firm increases their investments in capital, a positive effect on performance and risk is expected. For this reason, capital investment is a further important control variable that has to be taken into consideration (De Loecker, 2007).

Lagged productivity

Finally, time lags are specified that are used for the variables, to exclude problems from potential reverse causality in cross-sectional risk models. Thus, it is controlled for possible time effects, persistency in exportation and consequently for serial correlation which is the relationship between observations of productivity over specific periods of time. Lagged productivity is defined as the productivity at time $t - 1$ ($TFP_{i,t-1}$). It is assumed, that lagged productivity can be correlated with the productivity in $t = 0$. Consequently, the lagged productivity must be incorporated as a further control variable to control for unobserved heterogeneity and eliminate endogeneity bias (Bromiley, 1991; Reuer and Leiblein, 2000).

3.4 Econometric specification

To analyze the impact of export activity, export diversification and the operative flexibility on firm performance and risk during a period of economic downturn, the method of Difference-In-Difference is used in the present work. This methodological approach is used to compare productivity growth between exporting and non-exporting firms during the years of crisis between 2007-2011. The Difference-In-Difference model enables to test if the impact of the crisis leads to the consequence that exporting firms perform better in terms of a higher flexibility and productivity as well as lower risk than non-exporting firms. The mentioned results will then be further compared with the pre-crisis years and the post-crisis years, to demon-

strate that the effect is caused by the crisis and therefore the result of firm's strategic risk coverage opportunities.

In detail, the used methodology aims to analyze if risk coverage generated through internationalization as well as geographic diversity and the generated flexibility coming from real options, is an adequate tool to mitigate or attenuate the negative effects on performance and risk coming from uncertainty in form of an economic crisis. The challenge is to single out the impact of interest while controlling the potentially confounding effects. The mentioned methodology has already been used in previous research on real options and decisions in uncertain environments. These studies employed a natural experiment approach to study the effects of unanticipated changes (e.g. Chung and Beamish, 2005; Lee and Makhija, 2009; Dikova et al., 2013; Song et al., 2015). Regarding to this, the present analysis also applies such a natural-also called pseudo- or quasi-experiment which was already explained further in chapter 3.1 by adapting the Difference-In-Difference methodology.

The contributions made by the new trade theory, starting from Melitz (2003), are based on the idea of the existing sunk costs, which arise when the firm starts to export and which only can be covered by the most productive firms. This assumption verifies the existence of a selection bias (Eaton et al., 2004). Based on this self-selection, the comparison of exporting firms with a randomly selected group of non-exporting firms can be accompanied with difficulties and problems (Girma, 2005). The present paper circumvents the mentioned problem by using the Heckman's two-step procedure.⁷ This procedure corrects for potential self-selection bias and reverse causality. Firm's acquired knowledge which is generated through the exporting activity has a tacit and complex element which becomes an unobservable variable. Thus, the mentioned Inverse-Mills-ratio methods of Heckman are more appropriate to mitigate selection bias than the propensity score matching method (Tucker, 2010). Miller et al. (2007) show that "the advantage of two-stage treatment regression over full information structural approaches such as GMM, full information maximum likelihood, or three-stage least squares, is its lesser susceptibility to the proliferation of specification error and distortion". The first step of the procedure involves the estimation of the selection equation parameters by using a probit model with the method of maximum likelihood. In this step, the probit is estimating the probability of a firm to become an exporter. Thus, the probability of becoming an export starter as the

⁷ The Heckman procedure will be explained further in section 3.4.2.

predicted probability of a probit model is estimated. The second step involves the adjunction of the inverse Mill's ratio to the outcome equation to obtain consistent estimates, which in the present work is the Difference-In-Differences method (Heckman, 1979; Wooldridge, 1995).

3.4.1 Difference-In-Difference analysis

In the following, the Difference-In-Differences method is explained more precisely. In this regard, the Difference-In-Differences analysis is used, to make a causal inference on the productivity effect of exporting for Spanish manufacturing firms. It will analyze the differences in performance between the exporting and non-exporting firms, before and after the economic crisis which had the highest impact in the Spanish economy in 2009.

Thus, the problem which occurs is the evaluation of the causal effect of the exporting activity on performance, operative flexibility and risk. In order to solve this problem, a Difference-In-Difference model is implemented and explained in the following which is based on Bertrand (2004), Girma (2005) as well as on Cameron and Miller (2014). Firm i is exporting (EXP) at time t . The term $(y_{i,t+s}^1)$ represents the productivity if the firm exports while $(y_{i,t+s}^0)$ represents the hypothetical productivity if the firm had not exported. The causal effect of exporting activity on productivity in time $t + s$ is then reflected in the following difference $(y_{i,t+s}^1 - y_{i,t+s}^0)$. The average effect of the exporting activity on productivity can be expressed as:

$$\hat{\alpha} = E(y_{i,t+s}^1 - y_{i,t+s}^0 | EXP_{i,t} = 1) = E(y_{i,t+s}^1 | EXP_{i,t} = 1) - E(y_{i,t+s}^0 | EXP_{i,t} = 1) \quad (15)$$

An essential problem of causal inference which occurs and leads to confronting missing-data, is that the quantity $E(y_{i,t+s}^0 | EXP_{i,t} = 1)$ is unobservable, which is the average productivity of exporting firms, had they not decided to export. To solve this problem, a control group is created with non-exporting firms, which are enabled with similar characteristics to the firms that have exported (Girma, 2005).

After obtaining the control group, the Difference-In-Difference model is finally specified as follows:

$$y_{i,t}^j = \gamma_0 + \gamma_1 G^j + \sum_{\substack{t=2007 \\ t \neq 2009}}^{t=2011} \beta_t G_t + \sum_{\substack{t=2007 \\ t \neq 2009}}^{t=2011} \alpha_t G_t^j + \varepsilon_{i,t}^j \quad (16)$$

Where:

- $y_{i,t}^j$: is the performance of firm i ($i = 1, 2, 3, \dots, n$) belonging to group j , where j takes the value 1 for exporting firms and 0 for the control group in moment t . It is considered that $t = 0$ is in the year 2009, the year where the crisis had its highest impact to the Spanish economy;
- G^j : is a dummy variable that takes the value 1 in year t , where t has the values 2007, 2008, 2009 and 2011;
- G_t : is a dummy variable for every year with exception of the year 2009;
- G_t^j : is a dummy variable that takes the value 1 if the firm exports in moment t and 0 otherwise;
- $\varepsilon_{i,t}^j$: is the error term.

The intercept γ_0 and the slopes γ_1 , β_t , α_t are the coefficients of the Difference-In-Difference regression line. The γ_0 coefficient reflects the TFP growth average of firms included in the control group in the year 2009, where the crisis had its highest impact. The γ_1 coefficient represents the difference of TFP growth average between the exporting firms and the non-exporting firms. The β_t coefficient reflects the variation of TFP growth average of all firms in moment t . Finally, the coefficient α_t reflects if exporting firms display a different performance in comparison to non-exporting firms in time t . The dependent variables in Difference-In-Difference estimation can be highly positively serially correlated, and the coefficient α_t changes itself very little within a state over time. This creates a potentially large miss-measurement with the standard errors coming from the OLS estimation of equation (Bertrand,

2004; Girma, 2005; Cameron and Miller, 2014). In section 3.4.4 this problem will be further explained and solutions proposed.

In the further procedure, it is obligatory to integrate the possible observable factors that explain the productivity change. Thus, the dependent variable and a set of control variables $X_{i,t}^j$ (*Firm Size, Capabilities, Firm age, Capital investments and Lagged productivity*) which have already been introduced in section 3.3.3 are included. To control for unobservable heterogeneity, fixed effects for firms are incorporated.

In conclusion, the Difference-In-Difference model is testing if exporting firms demonstrate better performance in terms of a higher flexibility and productivity as well as lower risk than non-exporting firms. To demonstrate that the effect is caused by the crisis, the results are compared with the pre-crisis years and the post-crisis years.

3.4.2 Selection Bias and Heckman procedure

The problem which occurs by using observational data is that the firms in the treatment and control groups are not randomly selected. In the cross-section of the observed firms, they emerge in distinct organizational and industry patterns. The interested and observed variable may even influence how firms emerge as internationalized or domestic firms (Reeb et al., 2012). Thus, when using statistical analyses based on non-randomly selected samples, as in the present case the statistical technique of Difference-In-Difference that proceeds a quasi-experiment by using observational study data, the problem of endogeneity and self-selection can occur. Self-selection into exporting which refers to the ex-ante productivity (self-selection), is one explanation for higher productivity of exporting firms (Manjon et al., 2013).

The mentioned problem leads to inflated “t-statistics” and inconsistent estimates of the impact of firm internationalization on firm’s performance and risk. This in turn may lead to the rejection of true hypotheses or failure to reject false hypotheses (Reeb et al., 2012).

In detail, the existent portfolio of capabilities influence the performance. Without an appropriate set of capabilities, a higher degree of internationalization may not lead to better performance and reduced risk. In addition, different authors claim that an adequate set of capabili-

ties may lead the firms self-select them into exportation (Melitz, 2003). Pangarkar (2008) makes consequently the conclusion that a key task for SMEs is to build up an appropriate set of capabilities. In this case, it may be important for SMEs to address the issue of what comes first: build up the capabilities or internationalization? The mentioned capabilities should be developed in areas such as branding and marketing, technology development, financing and other areas useful for internationalization. Melitz (2003) claims that in the self-selection mechanism, firms need to reach a minimum productivity threshold to enter the more competitive foreign markets. Thus, only the ex-ante more productive firms are able to sell abroad. Self-selection postulates that productivity gains are a requirement for export participation and not a result. Therefore, self-selection does not offer any hint on the underlying mechanisms generating productivity differences across firms that have started to export.

The positive relationship between export and firm performance as well as risk reduction can be endogenous as well (Golovko and Valentini, 2011). Previous research has shown that exporting firms are enabled with higher productivity as well as higher productivity growth in comparison to firms without generated flexibility through exporting activity. The higher productivity of exporting firms is as already shown a cause and not a consequence. This is because internationalization is associated with costs that can be covered only by the most productive firms, which consequently self-select them into exports. This means, that international investments are correlated with higher performance which may be not an outcome of internationalization but rather the cause of exports (Roberts and Tybout, 1997; Clerides et al., 1998; Bernard and Jensen, 1999; Golovko and Valentini, 2011; Cassiman and Golovko, 2011).

Before explaining the “Heckman correction”, the problem of endogeneity will be described. In order to explain endogeneity, a single-equation ordinary least squares (OLS) regression will be used for the simplification of the problem and the statistical notions. Consequently, the OLS regression is:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (17)$$

Where:

Y_i is the outcome and X_i represents an explanatory factor; ε_i refers to the unobservable error term that represents variation of Y which cannot be explained by an explanatory variable; and β_i ($i = 0, 1$) represents parameters to be estimated.

Different key assumptions must be satisfied, to obtain an unbiased estimation of the coefficients. One key assumption is the independence between error term and explanatory variable X_i (Ruey-Jer et al., 2016)

In statistical models, endogeneity consequently refers to the problem that at least one regressor X_i is correlated with the error term ε_i in a certain regression. In the mentioned case, the OLS estimator is biased and cannot support the hypotheses for the effect of X_i on Y_i . The mentioned correlation with the error term has the consequence that the individual estimators are not consistent. A further consequence is that along the lines of a least squares regression, the first least squares assumption does not hold. The first assumption includes that the conditional mean of the error term ε_i given X_i is zero. (Baltagi, 2005; Ruey-Jer et al., 2016). In literature, three main sources of endogeneity exist, which are simultaneity, omitted variables, and sample selection bias. First, an omitted variable bias may exist. This occurs in the case that a regressor within a regression is correlated with an omitted variable. This leads to an over- or underestimation of the effect that the correlated independent variable X_i has on the independent variable Y_i . However, this generates the problem, that the correlation of the regressor with the omitted variable implies a correlation with the error term. This in turn leads to an inconsistent estimator. The second reason that cause endogeneity arises through the simultaneous variable bias. The causality runs in this case both, from X_i to Y_i and from Y_i to X_i , which leads to the same problem as previously described. Last of all, endogeneity may arise through an error in the variable bias. This signifies that X_i has a measuring error, which also leads to the error term correlation with the regressor. To this account, endogeneity implies that in line with the internationalization-performance research, the effect of internationalization on firm performance is not estimated accurately (Heckman, 1979; Baltagi, 2005).

The problem of endogeneity and self-selection can be also explained by using Heckman (1979). He was awarded the Nobel prize for his work regarding the sample selection bias as a specification error. With the objective to avoid the endogeneity and self-selection problems,

the sample selection bias of Heckman (1979) can be named as an adequate method to attain a consistent estimator and to avoid a potential sample bias associated with the mentioned endogeneity and self-selection problem. Thus, the method used in this work for the correction of self-selection is named in the literature as “Heckman correction” or “two-stage method”. The method of Heckman enables to avoid or correct the sample selection bias, triggered by the mentioned endogeneity and self-selection problems (Heckman, 1979; Horst, 2000). Different researchers adopted the Heckman’s two stage model to avoid any potential bias and misspecification errors, which validates the reason to use this method (e.g. Tong and Reuer, 2007; Chung et al. 2010; Cassiman and Golovko, 2011; Song, 2013).

Consequently, Heckman (1979) defines one adequate method to attain a consistent estimator and to solve the problem of self-selection and endogeneity. Using the Heckman two-stage method in the present study implies that by estimating the relationship between internationalization and performance respectively risk, it must be controlled for the likelihood of a firm deciding to undertake exportation, based on diverse unobserved characteristics. Thus, the first stage of the procedure involves the estimation of the so-called selection equation parameters by using a probit model with the method of maximum likelihood. The probit estimates the probability of a firm to be an exporting firm as a function of different explanatory variables. For this reason, it will be estimated the probability of becoming an export starter as the predicted probability of the following probit model:

$$P(Dit = 1) = \phi\{TFP_{i,t-1}, k_{i,t-1}, a_{i,t-1}, s_{i,t-1}, ind, year\} \quad (18)$$

Where:

$\phi(.)$ is the normal cumulative distribution function and the set of observable characteristics included in the model are lagged productivity ($TFP_{i,t-1}$), capital ($k_{i,t-1}$), age ($a_{i,t-1}$), size ($s_{i,t-1}$) as well as industry and year dummies.

Various studies use the mentioned variables when testing for self-selection into starting to export, which validates the reason for using them (e.g., Bertrand et al., 2004; Manjon et al., 2013; Song, 2013).

The second stage involves the addition of the inverse Mill's ratio to the so-called outcome equation to obtain consistent estimates by using the Difference-In-Difference method. The inverse Mill's ratio is the ratio of the probability density function over the cumulative distribution function of a distribution and is included in the second-stage model in addition to other covariates (Tong and Reuer, 2007; Stock and Watson, 2012). The Inverse Mills Ratio which is created by the choice model in the first stage of the procedure is added as a correction term for potential endogeneity to the second stage, to account for potential selectivity bias. In the second stage, the coefficients are estimated based on a Difference-In-Difference model. The second stage is therefore applied to fix possible problems from heteroscedasticity, contemporaneous correlation, and serial correlation (Heckman, 1979; Hitt et al. 1998; Tong and Reuer, 2007; Chung et al., 2007; Song, 2013).

In conclusion, the present study applies a Heckman's two-step procedure to test the hypotheses. As the present work is based on panel data, a panel data extension of this procedure as described in Wooldridge (1995) is used. Consequently, this procedure corrects potential self-selection bias and reverse causality. Firm's generated knowledge from the exporting activity has a tacit and complex component which it converts into an unobservable variable. It is for this reason that Heckman Inverse-Mills-ratio methods are more appropriate than the propensity score matching method to mitigate the selection bias (Tucker, 2010). Moreover, Miller et al. (2007) demonstrate that "the advantage of two-stage treatment regression over full information structural approaches such as GMM, full information maximum likelihood, or three-stage least squares, is its lesser susceptibility to the proliferation of specification error and distortion".

In the literature exist beyond Heckman's two stage method also other methods to solve the self-selection and endogeneity problems. In order to solve e.g. the omitted variable bias, one alternative is to include the omitted variable in a multiple regression. On the other hand, this is only reasonable in the case that data of the omitted variable is available. Moreover, in the case of a simultaneous causality bias, the multiple regression cannot eliminate the bias only by e.g. Ordinary Least Squares (OLS) (Baltagi, 2005; Stock and Watson, 2012). Thus, in the literature, different methods exist to solve the problem of endogeneity. However, one optimal method does not exist. The statement of Heckman et al. (1998): „the choice of an appropriate econometric model critically depends on the properties of the data on which it is applied...“ is valid. In the present analysis, the Heckman procedure is better suited than the matching pro-

cedure. One reason is that firm's knowledge which is generated through the exportation, has a tacit and complex component which makes the variable unobservable. The method of Heckman is able to solve this problem.

3.4.3 Thresholds regression for the treatment of non-linearity

As already described in section 2.2.3, curvilinear relationships may exist when analyzing the internationalization performance and risk relationship. Such nonlinearities have been captured empirically by different nonlinear econometric models such as the threshold autoregressive model (Tong, 1990), smooth transition regressions (Terasvirata, 1994) as well as nonlinear causality models (Diks and Panchenko, 2006).

The purpose of the present section is to contribute to the literature by examining asymmetric relations between internationalization and performance or rather operational flexibility and risk. The present section describes consequently the threshold regression approach or also known as the non-linear quantile regression approach which is used in the present work and based on Hansen (2000). It will be presented how Hansen's methodology allows an endogenous test to prove the existence and significance of threshold levels in the internationalization-performance relationship.

In this regard, a quantile is defined in statistics as a threshold, which means that a certain proportion of the observation values is less than the individual quantile and the remain part major. In this regard, the 0.10 quantile is the value where 10% of all values are less than this individual value. In the present work, the threshold regression approach is used to identify the levels of export propensity which cause a change in productivity, because it is possible to linearize the relationship and to use Heckman's two stage method. The 0.10 quantile is then the point where the volume of exportation respectively degree of internationalization is lower than 10% of firm's revenues (Lee and Li, 2012; Eckstein, 2013).

Thus, if as part of a regression analysis a non-linear relationship is identified, the given non-linearity can be considered through a non-linear model. The use of thresholds within the scope of a threshold model provides an adequate opportunity to consider such a non-linearity. However, one problem occurs because the threshold is often unknown. Thus, the threshold

must be estimated if it is unknown. Based on this, nonstandard econometric theory is required for reliable inference. So, regarding to the interested independent variable, potential thresholds can be calculated and incorporated in terms of threshold variables in the regression model. The threshold variables include ranks of characteristic values of the independent variable through which the empirical sample is allocated, in order to analyze the non-linear relation between the dependent and independent variable (Hansen, 2000).

The threshold regression approach challenges the obtained findings with the linear regression because the correction of selection bias by means of Heckman (1979) would not be appropriate in case of non-linear relation. In order to overcome this methodological problem, a threshold regression approach is used which allows the levels of export propensity which cause a change in performance to be identified.

Consequently, in the present work, the Difference-In-Difference approach will be extended by implanting such a threshold model, in order to implement a non-linear regression. With the implementation of a threshold model, possible changes within the internationalization-performance and the internationalization-risk relationship can be generated, which can occur in specific degrees of internationalization. Thus, the mentioned thresholds enable an observation of estimates within different ranges respectively degrees of internationalization. This means that some decision must be made concerning what the appropriate threshold is i.e., at which degree of internationalization the direction of the performance and risk function changes? When the value where the direction changes is unknown, some method has to be employed in order to detect possible thresholds (Hansen, 2000).

Regarding to statistical modeling, a threshold regression can be any model where a threshold value or a set of threshold values are used to differentiate ranges of values where the behavior predicted by the model varies in a significant way. In order to prove if a non-linear correlation between internationalization and performance respectively operative flexibility and risk exists, potential thresholds have to be identified and incorporated in the regression model. Subsequent has to be tested if a non-linear regression that uses thresholds would lead to better estimates of the regression in comparison with the conducted linear regression. In this regard, the Lagrange Multiplier (LM) test is used as an adaptability test. The LM test is identified in statistics as the test of a simple null hypothesis that a certain parameter is equal to some individual value. In the present analysis, the LM-test indicates if the threshold-based estimates

lead to a better goodness of fit. In this case, the threshold-based estimates explain better the relationship between internationalization, international diversity as well as operative flexibility on performance, respectively risk. If they explain better the relationship, the threshold estimates will be used in this work. Furthermore, the F-test values of the linear and non-linear regression can be compared to prove if the threshold regression is leading to better results than the linear regression (Baltagi, 2005).

As already said, the identification of thresholds is realized by applying the method of Hansen (2000). He considers the estimation of threshold panel regressions with individual specific effects. The following specification is utilized, where the relationship between changes in TFP and export intensity can be modeled. An empirical threshold regression model to test TFP is given by general equation regarding to Hansen (2000):

$$Y_{i,t} = \beta_1 X_{i,t} + \varepsilon_{i,t} \quad q_{i,t} \leq th \quad (19)$$

$$Y_{i,t} = \beta_2 X_{i,t} + \varepsilon_{i,t} \quad q_{i,t} > th \quad (20)$$

Where:

$Y_{i,t}$ is the dependent variable and $q_{i,t}$ the threshold variable capturing the internationalization, while $X_{i,t}$ is the independent variable. The threshold variable is used to split up the sample into two different groups. The model allows, depending on the $q_{i,t}$ values, the regression parameters to differ. The model (19)-(20) can also be written in a single equation by introducing a dummy variable $d_{i,t}(th) = I(q_{i,t} \leq th)$. When setting the variable $d_{i,t}(th) = q_{i,t} \leq th$, the equations (19)-(20) are equal to:

$$Y_{i,t} = \beta_2 X_{i,t} + a X_{i,t} I(q_{i,t} \leq th) + \varepsilon_{i,t} \quad (21)$$

With the sample split rule

$$q_{i,t} = Z_{i,t}\pi + u_{i,t} \quad (22)$$

where:

- a and $\beta_j, j = 1,2$ defines the intercept and slope coefficient of regime j ;
- $q_{i,t}$: threshold variable of firm i in time t ;
- $X_{i,t}$: is a vector of variables hypothesized to effect firms TFP;
- $I(\cdot)$: is the indicator function, a function that takes the value 1 if firm's export intensity i complies with the indicated inequalities in the moment t and 0 otherwise;
- th : is the threshold parameter;
- $\varepsilon_{i,t}$: the error term;
- $Z_{i,t}$: is a vector of instruments.

As a result, the Hansen (2000) estimation and inference approach is used consequently in models with unknown threshold parameters in order to detect possible thresholds. The threshold regression is implemented regarding equation (21), where regression residuals are examined to find out if the internationalization-performance relationship changes as the degree of internationalization changes. In detail, it will be analyzed firm's degrees of internationalization at which the growth in productivity can improve, to incorporate it then in the Difference-In-Difference model. The threshold methodology provides consequently the useful framework to separate degrees of internationalization with decrease in productivity from periods characterized by growth in productivity.

The groups or also called regimes are distinguished by the slopes β_1 and β_2 . The estimation is divided into regimes which depend on whether the threshold variable $q_{i,t}$ is smaller or higher than the threshold parameter th . It is presumed that the random error term $\varepsilon_{i,t}$ is independent of the explanatory variables distributed. In order to enable the construction of confidence intervals and tests of hypotheses, nonstandard asymptotic theory with T fixed and $N \rightarrow \infty$ is developed.

The threshold parameter th is unknown and will be estimated by using a minimization function as described in Hansen (2000). The computation method of the threshold estimate th uses the concentrated sum of squared errors function from (21):

$$S(th) = \sum_{t=1}^T (Y_{i,t} - \widehat{\beta}_2(th)X_{i,t} - \widehat{a}(th)X_{i,t}(th))^2 \quad (23)$$

The minimizer \widehat{th} is called the least squares estimate that yields the smallest sum of squared errors. It is the value that minimizes $S(th)$:

$$\widehat{th} = \arg \min_{th \in \tau} S(th) \quad (24)$$

Where:

τ can be approximated by a grid and is a bounded set of elements of $\{q_{i,t}, t = 1, \dots, T\}$. The slope estimates from the threshold model are figured as $\widehat{\beta}_2(\widehat{th})$ and $\widehat{a}(\widehat{th})$.

By using thresholds in a regression, the internationalization-risk relationship changes from linear into non-linear. Referring to this, the non-linearity is reached by examining the regression residuals in order to figure out at which marginal value of risk the relationship between internationalization and risk changes, as the degree of internationalization changes. Identifying different thresholds signifies that within the different identified thresholds the internationalization and performance respectively operative flexibility and risk relationship is dissimilar for Spanish firms. Regarding to this, the threshold effect is denoted by the difference of parameter estimates in sub-regimes. Consequently, the sample is divided into different groups, depending on whether the export volume is above or below a specific threshold. As example, an identified threshold of 50% can be used. This signifies that in case of an export volume less than 50% of their revenues, the impact on performance respectively operative flexibility and risk is different than to an export volume which is higher than 50%. It can turn from

negative to positive at this identified value and vice versa. Thus, the internationalization and performance or rather operative flexibility and risk relationship can be examined for Spanish firms having different degrees of diversification within different ranges from which different groups of exporting firms can be finally identified. Thus, once the estimated threshold is obtained, firms can be better informed about which regime will occur by observing the evolution of the threshold variable (Hansen, 2000).

Furthermore, it has to be proved if the threshold effect is significant. This can be done by testing the null hypothesis

$$H_0: \beta_1 = \beta_2 \quad (25)$$

It has to be noted that classical tests as the t-test have nonstandard distributions under the null hypothesis because the threshold th is not identified under the null hypothesis. Hansen (1996) applied a bootstrap method to simulate the asymptotic distribution of the following likelihood ratio (LR) test of H_0 :

$$LR_0 = (S_0 - S_1)/\hat{\sigma}^2 \quad (26)$$

where:

- S_0 and S_1 are the residual sum of squares under $H_0: \beta_1 = \beta_2$ and $H_1: \beta_1 \neq \beta_2$;
- $\hat{\sigma}^2$ is the residual variance under H_1 .

The LR test is used in econometric applications to test for specific parametric values. The asymptotic distribution of LR_0 is nonstandard and depends on the moments of the sample, and therefore critical values cannot be tabulated. Hansen (2000) shows how to bootstrap the distribution of LR_0 . In order to calculate the asymptotic P-values and to test the restriction of no threshold effects imposed by equation 31, the bootstrap procedure is implemented. The P-

values constructed from the bootstrap are asymptotically valid. Thus, when the hypothesis of linearity is rejected with $\beta_1 = \beta_2$, the original sample can be divided regarding the estimated threshold values.

Like already mentioned, the method of Hansen (2000) is used to identify possible thresholds. In this regard, the following specification is used to identify these possible thresholds:

$$TFP_{i,t} = \alpha_i + \beta_1 I(El_{i,t} \leq th) + \beta_2 Capital_{i,t} + \beta_3 Size_{i,t} + \beta_4 IPROD_{i,t} + \beta_5 IPROC_{i,t} + \varepsilon_{i,t} \quad (27)$$

where:

- $TFP_{i,t}$: is the total factor productivity of firm i in time t ;
- $El_{i,t}$: is the export intensity of firm i in time t ;
- $I()$: is the indicator function, a function that takes the value 1 if firm's export intensity i complies with the indicated inequalities in the moment t and 0 otherwise, th is the identified threshold;
- $Size_{i,t}$: is the size of firm i in time t ;
- $IPROD_{i,t}$: is a dummy variable that takes the value 1 if the firm puts the product innovation on the market and 0 otherwise;
- $IPROC_{i,t}$: is a dummy variable that takes the value 1 if the firm puts the process innovation on the market and 0 otherwise;
- $\varepsilon_{i,t}$: is the error term.

Regarding the method of Hansen (2000), thresholds were identified for the ranges between values 0.21 and 0.69. Thus, the internationalization and risk relationship is dissimilar for Spanish firms that have up to 21%, between 21% and 69% and more than 69% of their sales abroad. Consequently, the internationalization and risk relationship must be examined for Spanish firms presenting a diversification degree within the mentioned three ranges. A low internationalization level indicates consequently that the volume of exportation is lower than 21% of firm's total revenues. An intermediate geographic diversification level indicates an

export volume between 21% and 69% of firm's revenues. A high geographic diversification level of indicates finally an exportation volume which is higher than 69% and up to 100% of firm's total revenues.

3.4.4 Cluster-Robust Inference

The current section addresses the cluster-robust inference, to solve the potential problem of serial correlation. The mentioned problem arises often in literature using quasi-experimental methods and must be solved to get unbiased or consistent point estimates. As already mentioned in Section 3.4.1, the dependent variables in Difference-In-Difference estimation are highly positively serially correlated, and the coefficient α_t changes itself very little within a state over time. This creates a potentially large miss-measurement in standard errors coming from OLS estimation of equation (Bertrand et al., 2004). Regarding to this, it is supposed that model errors are uncorrelated across clusters but correlated within a cluster. The efficiency increases by correcting standard errors for heteroscedasticity and autocorrelation in the error term (Dikova et al., 2013).

As the present work uses Difference-In-Difference analysis, Bertrand et al. (2004) validate the importance of applying cluster-robust standard errors in Difference-In-Difference settings. Furthermore, they claim that since different authors ignore the bias in the estimated standard errors, it is important to treat this issue. Especially against the background that the independent variable of interest in Difference-In-Difference estimation is itself very serially correlated, which will further enhance the bias in standard errors. Thus, applying Difference-In-Difference estimates and their standard errors without controlling serial correlation will cause spurious results.

It is essential to obtain accurate standard errors which is se , the estimated standard deviation of the parameters $\hat{\beta}$. An asymptotic 95% confidence interval is $\hat{\beta} \pm 1.96 \times se$. Referring to this, the hypothesis testing is based on Wald t-statistic with the function $w = \hat{\beta} - \beta_0 / se$. In this regard b as well as se are critical elements for statistical inference, and it will be treated to get a "good" standard error se as it will be done to obtain $\hat{\beta}$. When the control for within-cluster error correlation fails, it may lead to misleading small standard errors and furthermore

to misleading slight confidence intervals which in detail signifies a large t-statistic and low p-values (Cameron and Miller, 2014).

Bertrand et al. (2004) suggest that serial correlation is an important problem for Difference-In-Difference methodology. Consequently, when using Difference-In-Difference estimation, the problem of autocorrelation has to be assumed and consequently treated. The modified Wald test is able to detect the problem of heteroscedasticity. In the same manner, the Wooldridge test shows evidence for the existence of autocorrelation (Cameron and Miller, 2014). Based on this, Bertrand et al. (2004) propose three different techniques that can solve this problem. The first technique is that time-series dimension can be removed by aggregating the data into two different periods which are pre- and post-intervention. The second technique is to estimate standard errors while allowing for an arbitrary covariance structure between time periods. The first two techniques can be used when a high number of groups exists. Otherwise, the techniques are not suitable. The third technique is based on the randomization inference testing methods and uses the distribution of estimated effects for placebo laws to form the distribution and is also applicable when a high number of groups exists. Thus, when the number of clusters is small or the within cluster correlation is high, analytical estimates of asymptotic variances perform poorly. One alternative solution is the wild bootstrap, which is robust to both concerns. Thus, the wild bootstrap performs well when the number of clusters is small, when the within-cluster dependence is high, and the cluster sizes are heterogeneous. The wild bootstrap allows to construct asymptotically valid bootstrap standard errors, hypothesis tests and confidence bands for the quantile regression coefficient function (Hagemann, 2016).

The efficiency of the option is generally depending on the number of clusters. A smaller number of clusters represents two central problems. The first one is that OLS is leading to "overfitting". Consequently, two error terms that are relatively close to zero are estimated in comparison with the real error term. This signifies that a downwards-biased cluster-robust variance matrix estimation is generated. Nevertheless, any clear rule which indicates the minimum number of clusters, does not exist. In detail, Cameron and Miller (2014) indicate by reviewing the observed results in previous works that it is depending on the situation. Few can signify a range from less than 20 up to less than 50 clusters in the balanced case, but also more clusters in the unbalanced case. Regarding to this, two problems are existent when few clusters are detected. The first is that OLS leads to overfitting with estimated residuals close

to zero in comparison with the true error terms. This in turn leads to a downwards-biased cluster-robust variance matrix estimate. A further problem is that also with bias-correction, the usage of fitted residuals leads to over-rejection and narrow confidence intervals, if the critical values are from standard normal distribution.

In the present work, the industry code is used to create the cluster whereby the number of industries considered is 19, which, regarding Cameron and Miller (2014), can be considered as low. In accordance with the mentioned criterion, 20 clusters could be insufficient, which in turn could lead to the problem of over-rejection (Cameron and Miller, 2014). One possible solution to solve the problem of over-rejection is to utilize the adjustment of cluster-robust estimation of the variance matrix (CRV), which is proposed by Bell and MacCaffrey (2002).

Regarding to Bell and MacCaffrey (2002) as well as Cameron and Miller (2014), the CRV model can be written as follows:

$$\gamma_g = X_g\beta + u_g \quad g = 1, \dots, G \quad (28)$$

Where:

y_g and u_g are $N_g \times 1$ vectors, X_g is $N_g \times K$ matrix, and there are N_g observations in cluster g . Further stacking y_g , X_g and U_g over the G clusters then yield the model:

$$\gamma = X\beta + u \quad (29)$$

This transformation is equal to the delete-one-cluster, which means the realization of a jack-knife estimation of the variance of the OLS estimator (CR2). The efficiency of the correction postulates homoscedasticity. The realized simulations by Cameron et al. (2008) contain that the mentioned correction diminishes but not eliminate the over-rejection when there are few clusters.

Similarly, with the objective to solve the autocorrelation problems, the statistical inference is employed, where observations can be grouped into clusters. In this regard, sectors are used as variables of clustering (Bertrand et al., 2004). Thus, one alternative solution is the utilization of cluster bootstrap with an asymptotic refinement. The simplest cluster resampling method is the pairs cluster resampling by resampling with replacements in all clusters. In this regard, Cameron et al. (2008) conclude that this type of bootstrap does not resolve the problem of over-rejection. They propose the utilization of a wild cluster bootstrap. In the present scientific work two different types of cluster bootstrap are used consequently. The two bootstrap types are used for the estimation of the signification level of the coefficients. The mentioned two types are the Jackknife bootstrap and the Wild cluster bootstrap proposed by Webb (2013). In this regard, the jackknife method drops each cluster and computes the leave-one-out estimate $\hat{\beta}_g, g = 1, \dots, G$, and then uses variance estimate $(G - 1)/G \Sigma_g (\widehat{\beta}_g - \hat{\beta})$. The wild bootstrap is proposed for regression in the no clustered case. Thus, the method is creating pseudo-samples which are based on $\hat{u}_g^* = \hat{u}_g$ with the probability 0.5 and $\hat{u}_g^* = -\hat{u}_g$ with the probability 0.5, with this allocation at the cluster level (Cameron et al., 2008).

3.4.5 Treatment of Collinearity

In addition to the continuing problems in the methodology of the present analysis, the problem of collinearity can occur. Collinearity refers to the existence of an exact or perfect linear relationship among exactly two independent variables of a regression model and multicollinearity refers to the case when a relationship between two or more independent variables of a regression model does exist.

Furthermore, it can be distinguished between perfect and non-perfect collinearity. Perfect multicollinearity occurs when the regression coefficients of the independent variables are indeterminate and their standard errors are infinite. Non-perfect multicollinearity in turn occurs when the regression coefficients of the independent variables are determined, with large standard errors. This signifies that the coefficients cannot be estimated accurately and precisely (Tay et al., 2012; Zainodin and Yap, 2013).

In detail, multicollinearity consequently may happen when high correlations among two or more independent variables in a multiple regression model exist. In this case, the independent variables can compete to explain much of the similar variance. It is also problematic to distinguish their contributions to the dependent variable. Consequently, when collinearity exists, the independent variables can compete in order to explain much of the similar variance and it can be problematic to distinguish their contributions to the dependent variable (Kutner et al., 2005; Zainodin et al., 2011; Zainodin and Yap, 2013).

Due to the problematic, which result from collinearity, the mentioned issue has to be treated. In this regard, several methods and tests exist that can be used to attenuate the problem of multicollinearity. Consequently, different multicollinearity tests are included in the present work to remove multicollinearity source variables from all possible models. In this regard, several criteria exist to detect the problem of collinearity in the analysis (Zainodin et al., 2011).

These criteria can be the t-statistics. In detail this means, that the t-statistics for the coefficients is not significant, even though the F is significant. That the IVs have radically different estimated effects. Then, that the explanatory variables indicate a high correlation ($r = .95$). A small sample size (N) is also used as an indicator (Kutner et al., 2005; Curto and Pinto, 2007; Zainodin et al., 2011; Zainodin and Yap, 2013).

All the mentioned methods are indicators that multicollinearity might be a problem in the data and the present analysis. Nevertheless, in the present work the indicators condition number as well as the variance inflation factor (VIF) are used as signs that collinearity might be existent and a problem in the data.

Thus, a proper indicator that collinearity may exist is the variance inflation factor. The VIF can be calculated as the inverse of the tolerance value and is derived from the fact that its square root is the degree, to which the standard error increases due to multicollinearity. However, a specific threshold value for multicollinearity does not exist. But, in the literature exist the rule that the VIF should not exceed the value of 10, whereby the critical value should be defined independently in every work, based on practical considerations and the individual analysis (Neter et al., 1985; Studenmund, 1992; Hair et al., 2006).

The indicators condition number is the square root of the ratio of the largest and the smallest eigenvalue of X . In detail, it is the square root of the maximum eigenvalue divided by the minimum eigenvalue. In the case that the Condition Number is higher than 30, the regression may have multicollinearity. A large condition number reflects consequently the existence of one or more near-linear dependencies among the explanatory variables (Curto and Pinto, 2007).

The existence of multicollinearity is accompanied by several consequences. Thus, even very high multicollinearity, with exception of a perfect one, does not violate OLS assumptions. OLS estimates are still unbiased and BLUE (Best Linear Unbiased Estimators). However, the higher the multicollinearity is, the higher are the standard errors. Thus, high multicollinearity leads to wide confidence intervals for coefficients and in addition to a small t -statistics. This signifies that the coefficients need to be higher in order to be statistically significant. Nevertheless, the high standard errors can also be caused by other factors besides multicollinearity. A further consequence is that the slope of coefficient estimators of IVs will tend to be high and negatively correlated when they are highly and positively correlated. When, e.g. b_1 is higher than β_1 , b_2 may be t less than β_2 . Finally, a different sample will tend to produce the contrary result. This means that, if the effect of one parameter is overestimated, the other will tend to be underestimated so that coefficient estimates tend to be very volatile among the samples (O'Brien, 2007, Chatterjee and Hadi, 2012).

When observing the consequences of multicollinearity, it seems logical that in case of consisting multicollinearity, it has to be reduced. One suggestion is to reconstruct the model by rejecting the independent variables that demonstrate a high correlation with the other independent variables. Another method in order to reduce collinearity is ridge regression. This technique biases the estimated regression coefficients and reduces the level of multicollinearity (O'Brien, 2007).

In order to examine whether collinearity is existent or not, two indicators are used as already mentioned. Both indicators, the condition number as well as the variance inflation factor (VIF) indicate a serious problem of collinearity. The mentioned problem is solved by excluding the dummy variables which indicate how many years have passed since the launch of the exporting activity.

In this manner, it can be appreciated that the explicit correlation coefficients VIF and the condition number show that multicollinearity is not a major problem in the present empirical analysis. This is because all explanatory variables (e.g. independent and control variables) have VIF's below the 10.0 criterion advocated by Neter et al. (1985) and Studenmund (1992). Furthermore, none of the VIFs are beyond the strictest limit of 5.3, which is proposed by Hair et al. (2006). In the same sense, the obtained condition numbers from the various models are below the critical level of 30, which is the point to consider the existence of serious collinearity problems.

4 Empirical results

The previous chapter 3 has described the methodology and methods used in this investigation. A summary of the main empirical findings and the principal issues and suggestions which have arisen in this discussion are provided in the present chapter, which contains the empirical results. Consequently, this part of the thesis discusses the findings which emerged from the statistical analysis presented in the previous chapters, to finally give a statistically significant response to the research question.

The present work uses a sample of Spanish manufacturing firms received from a longitudinal study named ESEE over the period between 2007 and 2011. The overall sample consists of a total of 1.713 firms which have less than 250 employees over a panel data. In these sample 947 firms have exported during the observed period between 2007 and 2011, whereby 766 cannot demonstrate any exporting activity during the mentioned period.

In previous empirical studies regarding the internationalization-performance relation, researcher obtained contradictory results. With the intention to clarify the mentioned relationship, in the present work the effect of export, export diversification and operative flexibility on firm's risk is analyzed by implementing a linear and a non-linear regression of firm performance to a measure of diversification and a set of control variables. Regarding to this, in the following chapter the model is described.

4.1 Impact of export activity on firm performance during the crisis period

The model

In the following, the model which is used in the present work is explained. Thus, to test and verify the established hypotheses, the work applies Heckman's two-step model, which corrects for potential self-selection bias. Firm's knowledge, generated through the exporting activity, has a tacit and complex component which makes the variable unobservable. Due to this reason, Heckman's two step procedure is more appropriate in this study than the propensity score matching method to mitigate selection bias (Tucker, 2010). The first step consists of estimating the selection equation parameters by using a probit model. The second step con-

sists of adding the inverse Mill's ratio to the outcome equation to get consistent estimates by using the Difference-In-Difference method.

In the first stage, a probit model is used. In the mentioned model the probability of being an exporter is determined. First, the export decision is modeled as an endogenous choice. Thus, the equation of selection is used. The probit estimates the probability of a firm becoming an exporting firm as a function of the explanatory variables. Consequently, the probability of becoming an export starter is estimated as the predicted probability of the following probit model:

$$P(D_{i,t} = 1) = \phi\{TFP_{i,t-1}, k_{i,t-1}, a_{i,t-1}, s_{i,t-1}, ind, year\} \quad (30)$$

Where:

$\phi(.)$ is the normal cumulative distribution function and the set of observable characteristics included in the model are lagged productivity ($TFP_{i,t-1}$), capital ($k_{i,t-1}$), age ($a_{i,t-1}$), size ($s_{i,t-1}$) as well as industry and year dummies. Various studies use the mentioned variables when testing for self-selection into starting to export, which validates the reason for using them (e.g., Bertrand et al., 2004; Manjon et al., 2013; Song, 2013).

In table 6 the results of the probit model can be observed which are used to control for selection bias. The three utilized models that are adapted to the three different samples are specified and afterwards applied in the second step of the Heckman correction. Thus, the three different samples contain first all firms (ALL), then non-exporting firms and firms that export with own resources (OR) and finally non-exporting firms and firms that export with external facilities or rather without own resources (WOR). The results are consistent with the results in disposable evidence. Thus, higher productivity, capital investment, age, size and effort in R&D increase the probability of exportation (e.g., Bertrand et al., 2004; Manjon et al., 2013; Song, 2013).

Table 6: Probit analysis (dependent variable: Export)

VARIABLES	(1) All EXPORT	(2) OR EXPORT	(3) WOR EXPORT
$(TFP_{i,t-1})$	0.494*** (0.033)	0.538*** (0.039)	0.422*** (0.042)
$Capital_{i,t-1}$	0.358*** (0.018)	0.396*** (0.021)	0.316*** (0.023)
$Age_{i,t-1}$	0.004*** (0.001)	0.007*** (0.001)	-0.002 (0.002)
$Size_{i,t-1}$	0.001 (0.001)	0.001*** (0.001)	-0.001** (0.001)
$R\&D_{i,t-1}$	3.953*** (1.275)	3.522** (1.408)	3.941*** (1.376)
Constant	-4.458*** (0.255)	-5.335*** (0.299)	-4.374*** (0.327)
Observations	5,473	4,443	3,477
LR $\chi^2(10)$	2,273.94***	1,905.84***	2,039.20***
Pseudo R ²	0.243	0.253	0.333

Sector dummies are included

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The model is estimated for three different samples: (1) all firms (ALL), (2) non-exporting firms and firms that export with own resources (OR), (3) non-exporting firms and firms that export with external facilities (without own resources) (WOR).

In the second-stage regression, the Difference-In-Difference model will be applied. Thus, the inverse Mill's ratio ($IMR_{i,t}$) obtained through the previous probit model will be added as a correction term for potential endogeneity to the two following outcome equations (Heckman, 1979; Wooldridge, 1995):

$$\begin{aligned}
 GTFP_{i,t} = & \gamma_0 + \gamma_1 EXP_{i,t} + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \beta_t Time_t + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_t (Time_t * EXP_{i,t}) + \gamma_2 X_{i,t} + \lambda IMR_{i,t} \\
 & + f_i + \varepsilon_{i,t}
 \end{aligned} \tag{31}$$

where:

- $GTFP_{i,t}$: is used as performance measure and is the increase in TFP of firm i in time t ;
- $EXP_{i,t}$: is a dummy variable that take the value 1 if firm i exports in moment t and 0 otherwise;
- $Time_t$: is a dummy variable that takes the value 1 for the year t and 0 for the rest of the years. The relevant measuring point as the basis for this calculation is the year 2009 which is the year where the crisis had its largest impact on the Spanish economy. Two previous years 2007 and 2008, as well as two subsequent years 2010 and 2011 are used;
- $X_{i,t}$: is a set of control variables;
- $IMR_{i,t}$: is the Inverse of Mill's Ratio of firm i in time t ;
- f_i : are firm fixed effects;
- $\varepsilon_{i,t}$: is the error term.

The intercept γ_0 and the slopes γ_1 , β_t , α_t can be named as the coefficients of the Difference-In-Difference regression line. The γ_0 coefficient presents the average in TFP growth of firms included in the control group in the crisis moment (2009). The γ_1 coefficient denotes the difference of TFP growth average between the exporting firms and the control group in any moment of time. The β_t coefficient reflects the variation of TFP growth average of all firms in time t . Then, coefficient α_t displays whether exporting firms display a dissimilar performance compared to non-exporting firms in time t .

Equation 38 will be estimated by using the Difference-In-Difference model. This model allows to test if the impact of the crisis leads to the result, that exporting firms present a better performance than non-exporting firms. These results will be compared with the years prior to the crisis and the post-crisis years in order to ensure that the effect is caused by the crisis and thus resulting from opportunities of firm's strategic risk coverage. It will be furthermore verified if the mentioned impact depends on the degree of the exporting activity. This means that the effect can change in relation to firm's share of export in the overall output.

Specifically, the coefficient α_t indicates if the exporting firms present a behavior that differs from the behavior of non-exporting firms in moment t . If this coefficient is significant and

positive for the years after 2009 as well as superior to the obtained coefficients during the years 2007 and 2008, hypothesis 1 can be verified. In this case, the export activity reduces firm's strategic risk.

In all the following models corresponding to equation 37, the modified Wald test precisely revealed the problem of heteroscedasticity. In addition, the Wooldridge test emphasized the existence of a serial correlation. In order to solve the potential problem of serial correlation, additionally it is also opting for a CRV proposed by Bell and MacCaffrey (2002). For this purpose, the industry code is used to create the cluster. However, the problem of over-rejection can occur because the number of industries considered in the study is low (19). Thus, the cluster jackknife method estimation and Wild Cluster Bootstrap proposed by Webb (2013) are used in order to estimate the significance levels of the coefficients.

Results

As already mentioned, different samples are used in the present analysis. The first includes all exporting as well as non-exporting firms. The second includes firms, exporting with own resources (OR) and non-exporting firms. The third sample includes firms, exporting without own resources (WOR) and non-exporting firms. The utilization of three different samples is necessary to analyze properly the effect of resource commitment in export activity.

In order to test for existent collinearity, which refers to the existence of an exact linear relationship among two independent variables, the VIF has been estimated. In this regard, the VIF has been estimated from the variables of the model, appreciating that all statistical data represent a value which is lower than 10. Consequently, a problem of multicollinearity does not exist. However, the analysis of the correlation matrix shows evidence of coefficients close to 0,7. In detail, these are the coefficients of interactions between the temporal dummy and the dummy variable which distinguishes the exporting from the non-exporting firms. This in turn can bias the obtained results. For this reason, the temporal variables are excluded from the model and the models 4, 5 and 6 are estimated (See table 7).

In the models 1, 2 and 3 (See table 7), where the temporal effects are maintained, can be deduced that firms have generated a higher growth in productivity during the years prior to

2009. During the year 2010, some recovery can be observed with inferior ratios to the ones of the years 2007 and 2008. It is a process that cannot be maintained during the year 2011. In these models were also tested for possible existence of collinearity.

The coefficient which corresponds to the variable $EXP_{i,t}$ and which permits to differentiate between exporting and non-exporting firms, is in neither of the three samples significant. The interactions of the mentioned variable with temporary effects over the years 2007 and 2008 are insignificant. From this position follows that during this period the exporting activity does not implicit a differentiating effect of productivity growth. However, the interactions after 2009, the year where the crisis had its highest economic impact in Spain, are significant and positive. This signifies that the exporting firms have experienced stronger growth in productivity during the economic crisis and it is therefore attributable to the diversification effect and the capacity of strategic risk coverage generated through the exporting activity. The results are analogous in all three samples and it is therefore necessary to realize a nuance. It follows consequently that during the period of economic recession, exporting firms have experienced higher growth of productivity in comparison to non-exporting firms which confirms hypothesis 1. Thus, export activity reduces strategic risk.

When comparing the obtained results for the sample of firms exporting with own resources (OR) and firms exporting without own resources (WOR), it can be observed that the positive effect in 2011 is relatively similar between firms exporting with and without own resources. Nevertheless, during the year 2010 the coefficient of firms exporting with own resources is nearly twice as high as of firms exporting without own resources. These results support the hypothesis 4 but does not verify them.

The potential problems of collinearity can question the obtained results, thus the temporal effects in the model will be excluded in models 3, 4 and 5. Therefore, the coefficients of variable $EXP_{i,t}$ show different results depending on the utilized sample. Thus, by observing the whole sample, the coefficient is significant and negative. However, the obtained coefficient of the interaction between the exportation variable and the temporal dummy variable is positive and significant. This means that exporting firms experienced the highest loss in productivity in the year 2009, which is the year where the crisis had its highest impact. Nevertheless, when analyzing the two different samples, the result remains only in case when firms do not export with own resources.

When observing the whole sample, the coefficients of the interaction between $EXP_{i,t}$ and the dummy variables which correspond to 2007 and 2009 are significant, positive and higher than for the variable $EXP_{i,t}$. This means that during the pre-crisis years the exporting firms have experienced a higher productivity growth than the non-exporting firms. The obtained outcome remains the same when differentiating the exporting firms by their level of resource commitment. However, productivity growth is higher when firms use their own resources to export. Thus, in any case can be observed that exporting firms have previous to the crisis a higher growth in productivity in comparison to non-exporting firms. These results support the hypothesis of “learning by exporting” (Delgado et al., 2002; Syverson, 2010; Cassiman and Golovko, 2011).

In the three samples can be observed that the coefficients of the interaction between $EXP_{i,t}$ and the temporal dummy variables are positive and significant during the period of recession. Moreover, the coefficients are higher than the obtained coefficients for the pre-crisis years. This can be explained due to the natural coverage effect implied in the exporting activity. This result and conclusion allows to verify hypothesis 1.

By observing the obtained results when dissociating the two samples into firms exporting with own resources and without own resources, the obtained coefficient for the interaction of the year 2010 is again higher for firms exporting with own resources. This result supports the hypothesis 4 (See table 7).

Table 7: Effects of exporting activity on the improvement of productivity during the economic crisis

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All GTFP	OR GTFP	WOR GTFP	All GTFP	OR GTFP	WOR GTFP
2007	0.019**	0.020***	0.019***			
OLS	(0.008)	(0.008)	(0.008)			
Jackknife	(0.007)	(0.007)	(0.008)			
WBW	0.016	0.003	0.000			
2008	0.016***	0.017***	0.015***			
OLS	(0.006)	(0.006)	(0.006)			
Jackknife	(0.006)	(0.006)	(0.006)			

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All GTFP	OR GTFP	WOR GTFP	All GTFP	OR GTFP	WOR GTFP
WBW	0.000	0.002	0.003			
2010	0.005*	0.005**	0.006**			
OLS	(0.003)	(0.003)	(0.003)			
Jackknife	(0.003)	(0.003)	(0.003)			
WBW	0.056	0.043	0.004			
2011	0.001	0.000	0.003			
OLS	(0.005)	(0.005)	(0.005)			
Jackknife	(0.005)	(0.005)	(0.005)			
WBW	0.839	0.948	0.429			
$EXP_{i,t}$	0.001	-0.001	0.002	-0.008**	-0.007	-0.008*
OLS	(0.006)	(0.010)	(0.007)	(0.006)	(0.012)	(0.006)
Jackknife	(0.005)	(0.009)	(0.006)	(0.005)	(0.010)	(0.006)
WBW	0.902	0.862	0.614	0.028	0.436	0.077
2007* $EXP_{i,t}$	0.000	0.001	-0.004	0.017***	0.018***	0.013***
OLS	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Jackknife	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
WBW	0.953	0.737	0.348	0.000	0.000	0.000
2008* $EXP_{i,t}$	-0.002	-0.002	-0.002	0.013***	0.013***	0.013***
OLS	(0.004)	(0.005)	(0.003)	(0.004)	(0.004)	(0.005)
Jackknife	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)
WBW	0.578	0.560	0.483	0.000	0.000	0.000
2010* $EXP_{i,t}$	0.014***	0.017***	0.008*	0.020***	0.022***	0.016**
OLS	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)
Jackknife	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
WBW	0.000	0.000	0.077	0.000	0.000	0.029
2011* $EXP_{i,t}$	0.016***	0.017**	0.015***	0.019***	0.019***	0.020***
OLS	(0.006)	(0.006)	(0.007)	(0.004)	(0.005)	(0.005)
Jackknife	(0.005)	(0.006)	(0.006)	-0.004	(0.005)	(0.004)
WBW	0.000	0.000	0.006	0.000	0.000	0.000
$TECDIS_{i,t-1}$	0.143***	0.144***	0.124***	0.143***	0.144***	0.127***
OLS	(0.036)	(0.043)	(0.036)	(0.038)	(0.045)	(0.039)
Jackknife	(0.033)	(0.039)	(0.033)	(0.034)	(0.041)	(0.036)
WBW	0.000	0.000	0.000	0.000	0.000	0.000
$Size_{i,t}$	0.050***	0.052***	0.048***	0.059***	0.062***	0.058***
OLS	(0.008)	(0.009)	(0.008)	(0.010)	(0.011)	(0.010)
Jackknife	(0.007)	(0.008)	(0.007)	(0.009)	(0.010)	(0.009)
WBW	0.000	0.000	0.000	0.000	0.000	0.000
$TFP_{i,t-2}$	-0.022***	-0.024***	-0.017***	-0.017***	-0.019***	-0.010**
OLS	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Jackknife	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
WBW	0.000	0.000	0.000	0.000	0.000	0.023
$Pub_{i,t-2}$	0.002***	0.002***	0.002***	0.002***	0.002***	0.002**

	(1)	(2)	(3)	(4)	(5)	(6)
	All	OR	WOR	All	OR	WOR
VARIABLES	GTFP	GTFP	GTFP	GTFP	GTFP	GTFP
OLS	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Jackknife	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
WBW	0.000	0.000	0.009	0.000	0.000	0.041
IMR _{<i>i,t</i>}	0.313***	0.314***	0.297***	0.316***	0.317***	0.303***
OLS	(0.025)	(0.032)	(0.028)	(0.026)	(0.033)	(0.028)
Jackknife	(0.026)	(0.034)	(0.030)	(0.027)	(0.036)	(0.030)
WBW	0.000	0.000	0.000	0.000	0.000	0.000
Constant	-0.467***	-0.480***	-0.482***	-0.485***	-0.505***	-0.502***
OLS	(0.038)	(0.043)	(0.036)	(0.042)	(0.047)	(0.043)
Jackknife	(0.044)	(0.049)	(0.044)	(0.049)	(0.054)	(0.051)
Max VIF	5.50	5.75	5.27	3.35	4.00	4.12
Determinant Number	22.455	21.276	20.540	19.547	19.137	18.603
Observations	5,473	4,443	3,477	5,473	4,443	3,477
Firms	1,713	1,452	1,097	1,713	1,452	1,097
R-squared	0.633	0.649	0.6441	0.626	0.640	0.635

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In all models can be observed that the technological activity and the effort in advertising permit a higher increase in productivity, which further support the obtained results. These results are in compliance with Lee et al. (2012). They claim that advertising intensity as technological intensity increases firm's performance and consequently reduces the risk. Similarly, firm size implies a higher increase in productivity which is consistent with the disposable evidence. Therefore, Lee and Makhija (2009) claim that larger firms contain resources that mitigate negative effects of adverse environmental conditions such as an economic crisis. The lagged productivity is significant and negative which confirms the hypothesis of convergence. Finally, the IMR is significant which supports regarding to Heckman (1979) and Tucker (2010) the existence of a selection bias which has been controlled adequately.

4.2 Impact of export propensity on firm performance during the crisis period in dependence on the export mode

The model

The effect of strategic risk coverage collects the geographic diversification effect as well as the possible implementation of flexibility options which are generated through the export activity. However, the used measure does not allow to discern the magnitude from each of them. Furthermore, the possible problems of collinearity are able to question the robustness of the obtained results. With the objective to deepen and develop the function of implicit coverage in export activity, it is analyzed whether the effect depends on the export propensity. This also enables to solve the problem of collinearity, identified in the previous specification. Thus, the dummy variable ($EXP_{i,t}$) which distinguishes the exporting from the non-exporting firms is replaced in the model by a continuous variable which measures the export propensity ($EL_{i,t}$). The mentioned variable is calculated by the ratio between the export volume and sales volume. It indicates consequently which percentage of firm's total turnover is assigned to exportation. The following model is used:

$$GTFP_{i,t} = \gamma_0 + \gamma_1 EL_{i,t} + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \beta_t Time_t + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_t (Time_t * EL_{i,t}) + \gamma_2 X_{i,t} + \lambda IMR_{i,t} + f_i + \varepsilon_{i,t} \quad (32)$$

where:

- $GTFP_{i,t}$: is used as performance measure and is the increase in TFP of firm i in time t ;
- $EL_{i,t}$: is a continuous variable which measures the export propensity of firm i moment t ;
- $Time_t$: is a dummy variable that takes the value 1 for the year t and 0 for the rest of the years. The relevant measuring point as the basis for this calculation is the year 2009 which is the year where the crisis had its largest impact on the productive fabric

of the Spanish economy. Two previous years 2007 and 2008, as well as two subsequent years 2010 and 2011 are used;

- $X_{i,t}$: is set of control variables;
- $IMR_{i,t}$: is the Inverse of Mill's Ratio of firm i in time t ;
- f_i : are firm fixed effects;
- $\varepsilon_{i,t}$: is the error term.

Results

The results obtained from the new model are similar to the results in the previous model (See table 8). However, they contribute new evidence which has to be clarified. Thus, the export propensity is only statistically significant when incorporating firms in the sample that export without own resources. In this case, the effect is negative and significant. This signifies that firms exporting without own resources present a minor productivity growth in comparison to non-exporting firms during the year 2009. However, this did not occur when firms export with own resources. This result supports hypothesis 4 which claims that resource commitment in export activity is able to reduce the strategic risk (See table 8).

The interactions of $(EI_{i,t})$ with the temporal variable are in none of the samples significant for the years prior to the crisis. The interactions of the temporal effect with the export propensity, measure the effect of being an exporter on productivity growth. Thus, the results differ in relation to the export mode. During the years prior to the crisis, firms exporting with own resources do not differ significantly in productivity growth from non-exporting firms. However, firms exporting without own resources present a minor productivity growth than exporting firms. It can be deduced, that this entry mode does not lead only to a minor process control. The margin can be minor as well in comparison to those firms selling exclusively to local markets. In both cases the exporting firms are presenting a higher growth in productivity during the period of recession (2010 and 2011), than non-exporting firms. The reason can be due to the coverage effect of implicit risk in export activity. This result verifies hypothesis 1 (See table 8).

As in the previous model, evidence exist which confirms that firms exporting with own resources demonstrate a better performance during the year 2010. This difference mitigates sig-

nificantly during the subsequent year (2011). This fact demonstrates that the utilization of own resources is able to have a positive effect on operative flexibility. This deduction supports also hypothesis 4, which is the export mode effect.

When observing the control variables, the results are equal to the results in the previous models. Consequently, firm size and IMR are significant and positive, which support the existence of a selection bias. The lagged productivity in turn is significant and negative. This confirms the hypothesis of convergence. Finally, the technological intensity and advertising are significant and positive, as well. This result increases the productivity, which further support the obtained results.

Table 8: Effects of exporting propensity on the improvement of productivity during the economic crisis

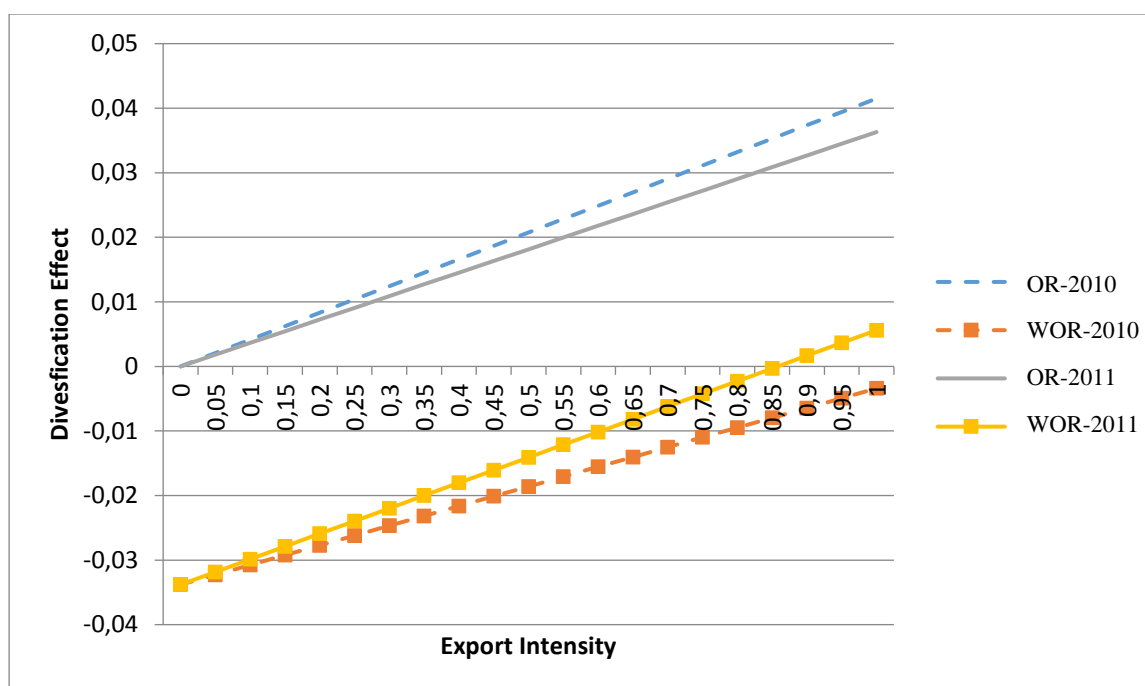
	(1) All GTFP	(2) OR GTFP	(3) WOR GTFP
2007	0.018***	0.017***	0.018**
OLS	(0.006)	(0.006)	(0.007)
Jackknife	(0.006)	(0.006)	(0.007)
WBW	0.000	0.000	0.020
2008	0.014***	0.014***	0.013**
OLS	(0.005)	(0.005)	(0.006)
Jackknife	(0.005)	(0.005)	(0.005)
WBW	0.000	0.000	0.018
2010	0.007*	0.007**	0.007*
OLS	(0.004)	(0.004)	(0.004)
Jackknife	(0.004)	(0.003)	(0.004)
WBW	0.059	0.034	0.059
2011	0.004	0.004	0.005
OLS	(0.003)	(0.004)	(0.004)
Jackknife	(0.003)	(0.004)	(0.003)
WBW	0.180	0.250	0.153
$El_{i,t}$	-0.014	0.000	-0.034***
OLS	(0.011)	(0.011)	(0.019)
Jackknife	(0.010)	(0.010)	(0.017)
WBW	0.141	0.992	0.000
$2007*El_{i,t}$	0.009	0.014	-0.011
OLS	(0.018)	(0.020)	(0.027)
Jackknife	(0.016)	(0.018)	(0.025)
WBW	0.469	0.370	0.562

	(1) All GTFP	(2) OR GTFP	(3) WOR GTFP
2008* $EI_{i,t}$	0.002	-0.001	0.012
OLS	(0.009)	(0.010)	(0.011)
Jackknife	(0.008)	(0.009)	(0.010)
WBW	0.767	0.905	0.155
2010* $EI_{i,t}$	0.039***	0.042***	0.030**
OLS	(0.009)	(0.010)	(0.011)
Jackknife	(0.008)	(0.009)	(0.010)
WBW	0.000	0.000	0.017
2011* $EI_{i,t}$	0.036***	0.036***	0.039***
OLS	(0.008)	(0.006)	(0.018)
Jackknife	(0.006)	(0.006)	(0.016)
WBW	0.000	0.000	0.000
$TECDIS_{i,t-1}$	0.144***	0.102**	0.132***
OLS	(0.037)	(0.036)	(0.028)
Jackknife	(0.034)	(0.033)	(0.026)
WBW			
$Size_{i,t}$	0.051***	0.052***	0.045***
OLS	(0.008)	(0.009)	(0.008)
Jackknife	(0.007)	(0.033)	(0.007)
WBW			
$TFP_{i,t-2}$	-0.022***	-0.027***	-0.021***
OLS	(0.005)	(0.005)	(0.005)
Jackknife	(0.005)	(0.008)	(0.005)
WBW			
$Pub_{i,t-2}$	0.002**	0.002***	0.002**
OLS	(0.001)	(0.001)	(0.001)
Jackknife	(0.001)	(0.001)	(0.001)
WBW			
$IMR_{i,t}$	0.310***	0.245***	0.299***
OLS	(0.027)	(0.027)	(0.023)
Jackknife	(0.027)	(0.028)	(0.022)
WBW			
Constant	-0.465***	-0.489***	-0.574***
OLS	(0.038)	(0.045)	(0.038)
Jackknife	(0.044)	(0.049)	(0.049)
Max VIF	2.27	2.25	2.04
Determinant Number	20.216	20.187	19.411
Observations	5,473	4,443	3,477
Firms	1713	1452	1097
R-squared	0.635	0.647	0.647

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In Figure 11, the diversification effect of firms with and without own resources is presented for the crisis years. It can be observed, that firms which export with own resources are enabled with a better coverage mechanism than firms which export without own resources. This deduction permits also to confirm hypothesis 4. Thus, the commitment in internationalization resources improves the coverage effect gained through the geographic diversification.

Figure 11: Diversification effect of firms exporting with and without own resources



Source: Own elaboration based on table 8

4.3 Impact of export activity on firm performance during the crisis period considering non-linear relations

The model

In previous chapters the existence of a non-linear relation between firm's exporting activity and its effect on productivity has already been discussed. This challenges the obtained findings up to now because the correction of selection bias by means of Heckman (1979) would

not be appropriate in case of non-linear relations. In order to overcome this methodological problem, a threshold regression approach is used which allows to identify the levels of export propensity which cause a change in productivity. This allows to linearize the relationship and use the Heckman's two stage method in order to avoid the selection bias.

The identification of thresholds was realized by applying the method of Hansen (2000). As already shown in section 3.5, the following specification was used to identify possible thresholds:

$$TFP_{i,t} = \alpha_i + \beta_1 I(EL_{i,t} \leq th) + \beta_2 Capital_{i,t} + \beta_3 Size_{i,t} + \beta_4 IPROD_{i,t} + \beta_5 IPROC_{i,t} + \varepsilon_{i,t} \quad (33)$$

where:

- $TFP_{i,t}$: is the total factor productivity of firm i in time t ;
- $EL_{i,t}$: is the export intensity of firm i in time t ;
- $I(\cdot)$: is the indicator function, a function that takes the value 1 if firm's export intensity i complies with the indicated inequalities in the moment t and 0 otherwise, th is the identified threshold;
- $Size_{i,t}$: is the size of firm i in time t ;
- $IPROD_{i,t}$: is a dummy variable that takes the value 1 if the firm puts the product innovation on the market and 0 otherwise;
- $IPROC_{i,t}$: is a dummy variable that takes the value 1 if the firm puts the process innovation on the market and 0 otherwise;
- $\varepsilon_{i,t}$: is the error term.

The identification of thresholds was consequently realized by applying the method of Hansen (2000). $EL_{i,t}$ indicates that the mentioned ranges were observed for the threshold values 0.21 and 0.69. This means that the internationalization and risk relationship is dissimilar for Spanish firms that have up to 21%, between 21% and 69% and more than 69% of their sales abroad. Thus, the internationalization and risk relationship has to be examined for Spanish

firms having a degree of diversification within three ranges from which three groups of exporting firms are identified. Low level of internationalization signifies that the volume of exportation is lower than 21% of firm's total revenues. Intermediate level of geographic diversification is specified for a volume of exportation between 21% and 69% of their revenues. High level of geographic diversification determines an exportation volume, higher than 69% and up to 100% of firm's total revenues.

To account for the risk-dependence on the degree of internationalization, respectively the range of diversification and the risk that a firm experience, the Difference-In-Difference was finally undertaken by using the two thresholds at the 21% and the 69% diversification level (Hansen, 2000). Thus, two thresholds are identified. In table 10 the results of the LM-test can be observed. It generates two thresholds that allow the identification of three groups of exporting firms:

- Low level of geographic diversification: volume of exportation is lower than 21% of their revenues.
- Intermediate level of geographic diversification: volume of exportation is between 21% and 69% of their revenues.
- High level of geographic diversification: volume of exportation is higher than 69% of their revenues.

Table 9: Identification test of thresholds: p-value of LM-test

	Threshold Estimate	LM-test for no threshold
First threshold	0.21	28.23***
Second threshold	0.69	20.53**
Number of Bootstrap Replications: 5000		
Trimming Percentage: .15		
*** p<0.01, ** p<0.05, * p<0.1		

Once the thresholds are identified, the following specification of the model is proposed:

$$\begin{aligned}
GTFP_{i,t} = & \gamma_0 + \gamma_1 I(EL_{i,t} \leq th_1) + \gamma_2 I(th_1 < EL_{i,t} \leq th_2) + \gamma_3 I(th_2 < EL_{i,t}) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \beta_t Time_t + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{1,t} (Time_t * I(EL_{i,t} \leq th_1)) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{2,t} (Time_t * I(th_1 < EL_{i,t} \leq th_2)) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{3,t} (Time_t * I(th_2 < EL_{i,t})) \\
& + \gamma_3 X_{i,t} + \lambda IMR_{i,t} + f_i + \varepsilon_{i,t}
\end{aligned} \tag{34}$$

where:

- $GTFP_{i,t}$: was used as performance measures of TFP growth of firm i in time t ;
- $EL_{i,t}$: export intensity of firm i in time t ;
- $Time_t$: dummy variable that takes the value 1 in year t and 0 for the other years. The reference point of the impact is the most impacted crisis year in the Spanish economy (2009) whereby the two previous years 2007 y 2008, and subsequent years 2010 and 2011 are utilized;
- $I(\cdot)$: is a function that takes the value 1 if firm's export intensity i complies with the indicated inequalities in the moment t and 0 otherwise, th_k is the identified threshold;
- $GEX_{i,t}$: exportation growth of firm i in time t ;
- $X_{i,t}$: set of control variables;
- $IMR_{i,t}$: Inverse of Mill's Ratio;
- f_i : firm fixed effects;
- $\varepsilon_{i,t}$: the error term.

Results

The current specification does not cause problems of collinearity. The obtained results with temporal control variables and the IMR are analogous to the presented in the previous specifications. The robustness of the used model is consequently confirmed (See table 11).

The LM-test shows if the threshold-based estimates are leading to a better goodness of fit. If their leading to a better goodness of fit, the threshold-based estimates explain better the relationship between internationalization, international diversity as well as operative flexibility on performance and firm's risk. As they explain the relationship better, the threshold estimates will be used in this work. Furthermore, the F-test values of the linear and non-linear regression are compared to prove if the threshold regression lead to better results than the linear regression. Thus, the LM test presents a higher F statistic for a linear regression than a threshold regression (See table 10). This leads to the assumption, that a non-linear regression, by using thresholds regarding the percentage of sales abroad, do not lead to better results than the ones obtained by linear regression.

The identified thresholds are not significant when using the whole sample. This result is consistent with the obtained results in the previous specifications. The interactions of the thresholds with temporal variables give a deeper knowledge of coverage performance caused by the geographic diversification effect. During the years prior to the crisis, the mentioned interactions are not significant for any level of exporting propensity. It coincides once more with the obtained results in previous specifications (See table 11). However, the identified thresholds are in no case significant with exception of the case when using the sample that includes firms exporting without own resources and on which the share in foreign sales exceeds 69%. With exception of this case, the exporting firms do not present any distinct performance in comparison to the non-exporting firms during 2009 (See table 10).

In the same manner can be observed that the coefficients of the interactions between the temporal variables which correspond to the pre-crisis years (2007 and 2008) and the various levels of internationalization are not significant. During the first year of the crisis, the coefficients of the interactions between the temporal variable 2010 and the dummy variable which identifies firms which export less than 21% $[2010 * I(EI_{i,t} \leq 0.21)]$, are in neither case significant. This means that the coverage effect cannot be assignet to firms with low level of ex-

portation. The obtained coefficients for firms with intermediate exporting activity, which in detail means an exporting activity between 21% and 69% of their revenues $[2010 * I(0.21 < EI_{i,t} \leq 0.69)]$, is for the whole sample and for the sample which includes firms with own exporting resources, significant and positive. However, the coefficient is no longer significant when firms export without own resources. When analyzing the interactions with the dummy variable which identifies firms with high internationalization level $[2010 * I(0.69 < EI_{i,t})]$ by using various samples, similar results are obtained (See table 10).

The obtained coefficients for the interactions of the year 2011 are significant and positive for all internationalization levels and for all three samples. Furthermore, the value increases simultaneously to the internationalization level (See table 10).

Table 10: Effects of exporting activity on productivity growth during the economic crisis considering non-linear relations

VARIABLES	(1) All GTFP	(2) OR GTFP	(3) WOR GTFP
2007	0.019***	0.017***	0.019***
OLS	(0.008)	(0.008)	(0.008)
Jackknife	(0.007)	(0.007)	(0.007)
WBW	0.000	0.003	0.002
2008	0.016***	0.015***	0.015***
OLS	(0.006)	(0.006)	(0.006)
Jackknife	(0.006)	(0.006)	(0.006)
WBW	0.000	0.002	0.002
2010	0.005*	0.006*	0.006**
OLS	(0.003)	(0.004)	(0.003)
Jackknife	(0.003)	(0.004)	(0.003)
WBW	0.066	0.050	0.017
2011	0.001	0.002	0.002
OLS	(0.005)	(0.006)	(0.005)
Jackknife	(0.005)	(0.005)	(0.005)
WBW	0.822	0.953	0.396
Export Intensity $I(EI_{i,t} \leq 0.21)$	0.005	0.003	0.005
OLS	(0.006)	(0.009)	(0.007)
Jackknife	(0.005)	(0.008)	(0.007)
WBW	0.236	0.350	0.296

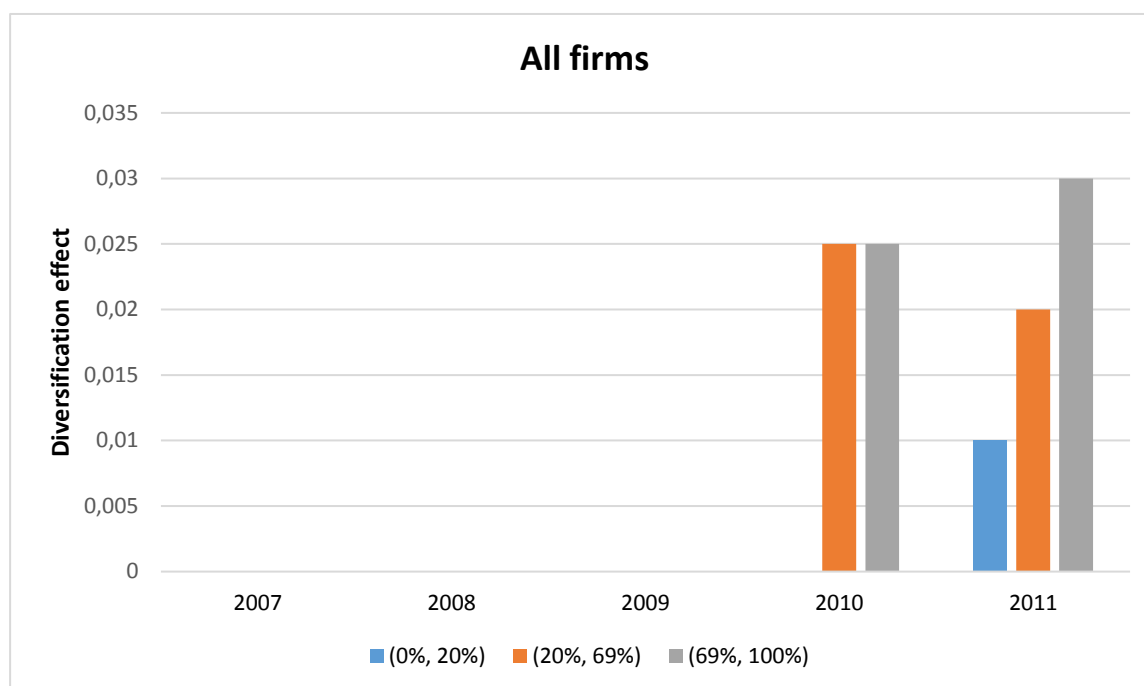
	(1)	(2)	(3)
VARIABLES	All	OR	WOR
	GTFP	GTFP	GTFP
$I(0.21 < EI_{i,t} \leq 0.69)$	-0.006	-0.008	-0.000
OLS	(0.008)	(0.013)	(0.010)
Jackknife	(0.007)	(0.010)	(0.009)
WBW	0.261	0.544	0.984
$I(0.69 < EI_{i,t})$	-0.007	-0.002	-0.035***
OLS	(0.011)	(0.013)	(0.018)
Jackknife	(0.010)	(0.012)	(0.017)
WBW	0.373	0.899	0.000
Year*Export Intensity			
$2007 * I(EI_{i,t} \leq 0.21)$	-0.003	-0.002	-0.004
OLS	(0.006)	(0.008)	(0.006)
Jackknife	(0.006)	(0.008)	(0.005)
WBW	0.567	0.639	0.398
$2007 * I(0.21 < EI_{i,t} \leq 0.69)$	0.002	0.005	-0.010*
OLS	(0.007)	(0.007)	(0.010)
Jackknife	(0.006)	(0.006)	(0.009)
WBW	0.757	0.621	0.074
$2007 * I(0.69 < EI_{i,t})$	0.006	0.010	-0.011
OLS	(0.014)	(0.015)	(0.029)
Jackknife	(0.013)	(0.014)	(0.027)
WBW	0.567	0.462	0.685
$2008 * I(EI_{i,t} \leq 0.21)$	-0.004	-0.004	-0.003
OLS	(0.005)	(0.007)	(0.004)
Jackknife	(0.005)	(0.006)	(0.004)
WBW	0.253	0.232	0.248
$2008 * I(0.21 < EI_{i,t} \leq 0.69)$	0.002	0.003	-0.003
OLS	(0.005)	(0.006)	(0.009)
Jackknife	(0.005)	(0.006)	(0.008)
WBW	0.664	0.688	0.615
$2008 * I(0.69 < EI_{i,t})$	-0.000	-0.003	0.014
OLS	(0.009)	(0.008)	(0.020)
Jackknife	(0.009)	(0.008)	(0.019)
WBW	0.944	0.440	0.462
$2010 * I(EI_{i,t} \leq 0.21)$	0.005	0.005	0.004
OLS	(0.005)	(0.006)	(0.006)
Jackknife	(0.005)	(0.006)	(0.006)
WBW	0.220	0.155	0.374
$2010 * I(0.21 < EI_{i,t} \leq 0.69)$	0.025***	0.028***	0.013
OLS	(0.009)	(0.008)	(0.012)
Jackknife	(0.007)	(0.007)	(0.011)
WBW	0.000	0.000	0.211
$2010 * I(0.69 < EI_{i,t})$	0.025***	0.025***	0.019

	(1)	(2)	(3)
VARIABLES	All GTFP	OR GTFP	WOR GTFP
OLS	(0.008)	(0.008)	(0.022)
Jackknife	(0.008)	(0.007)	(0.021)
WBW	0.002	0.005	0.226
2011 * $I(El_{i,t} \leq 0.21)$	0.010**	0.008*	0.012**
OLS	(0.007)	(0.008)	(0.009)
Jackknife	(0.007)	(0.007)	(0.008)
WBW	0.026	0.094	0.038
2011 * $I(0.21 < El_{i,t} \leq 0.69)$	0.020***	0.018***	0.021***
OLS	(0.006)	(0.008)	(0.008)
Jackknife	(0.005)	(0.007)	(0.007)
WBW	0.000	0.000	0.030
2011 * $I(0.69 < El_{i,t})$	0.030***	0.030***	0.026*
OLS	(0.008)	(0.007)	(0.018)
Jackknife	(0.007)	(0.006)	(0.017)
WBW	0.000	0.000	0.070
$TECDIS_{i,t-1}$	0.144***	0.101**	0.132***
OLS	(0.037)	(0.035)	(0.030)
Jackknife	(0.034)	(0.032)	(0.027)
WBW	0.000	0.000	0.000
$Size_{i,t}$	0.050***	0.051***	0.044***
OLS	(0.008)	(0.009)	(0.008)
Jackknife	(0.007)	(0.008)	(0.007)
WBW	0.000	0.000	0.000
$TFP_{i,t-2}$	-0.021***	-0.027***	-0.021***
OLS	(0.005)	(0.005)	(0.005)
Jackknife	(0.005)	(0.005)	(0.005)
WBW	0.000	0.000	0.000
$Pub_{i,t-2}$	0.002***	0.002***	0.002**
OLS	(0.001)	(0.001)	(0.001)
Jackknife	(0.006)	(0.001)	(0.001)
WBW	0.001	0.001	0.018
$IMR_{i,t}$	0.312***	0.245***	0.303***
OLS	(0.026)	(0.027)	(0.022)
Jackknife	(0.027)	(0.028)	(0.050)
WBW	0.000	0.000	0.000
Constant	-0.467***	-0.487***	-0.577***
OLS	(0.038)	(0.045)	(0.039)
th ₁	0.21	0.21	0.21
th ₂	0.69	0.69	0.69
Max VIF	6.41	6.22	5.94
Determinant Number	21.986	21.298	20.599
Observations	5,473	4,443	3,477

	(1)	(2)	(3)
VARIABLES	All GTFP	OR GTFP	WOR GTFP
Firms	1,713	1,452	1,097
R-squared	0.636	0.648	0.650
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

When using the whole sample, the interactions with the internationalization degrees are not significant during the pre-crisis period. However, the coefficients are significant and positive in 2010, only when a firm achieves at least an internationalization level of 21%. Thus, it is verified that the diversification of the export activity presents only in case of a determined level of internationalization a coverage effect which occurs one year after the crisis had its highest impact. Similarly, in 2011, two years after the highest impact of the crisis, all coefficients become positive and even higher with an increasing degree of internationalization (See figure 12). These results permit to confirm hypothesis 1. With nuances, hypothesis 2 can be verified, as well. The degree of internationalization does not conditions only the coverage quality but also the moment in which the coverage is realized. Similarly, the lack of evidence shows the existence of flexibility options generated through the exporting activity, which will be further analyzed in the subsequent section.

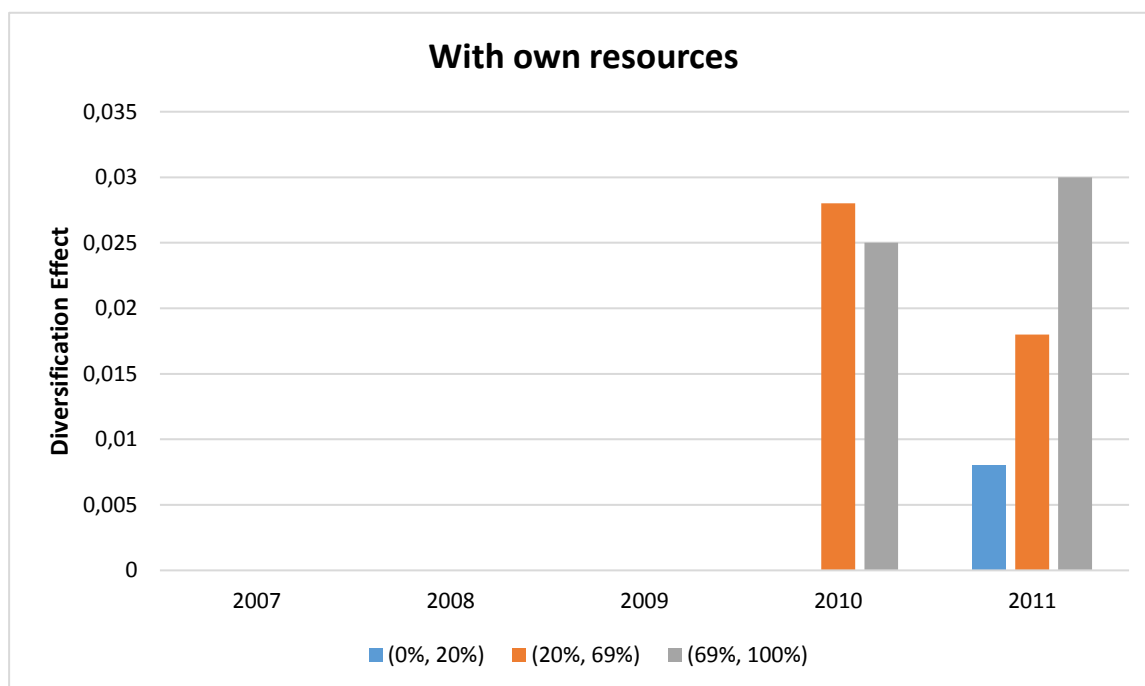
Figure 12: The non-linear effect of exporting propensity on productivity growth



Source: Own elaboration based on table 11

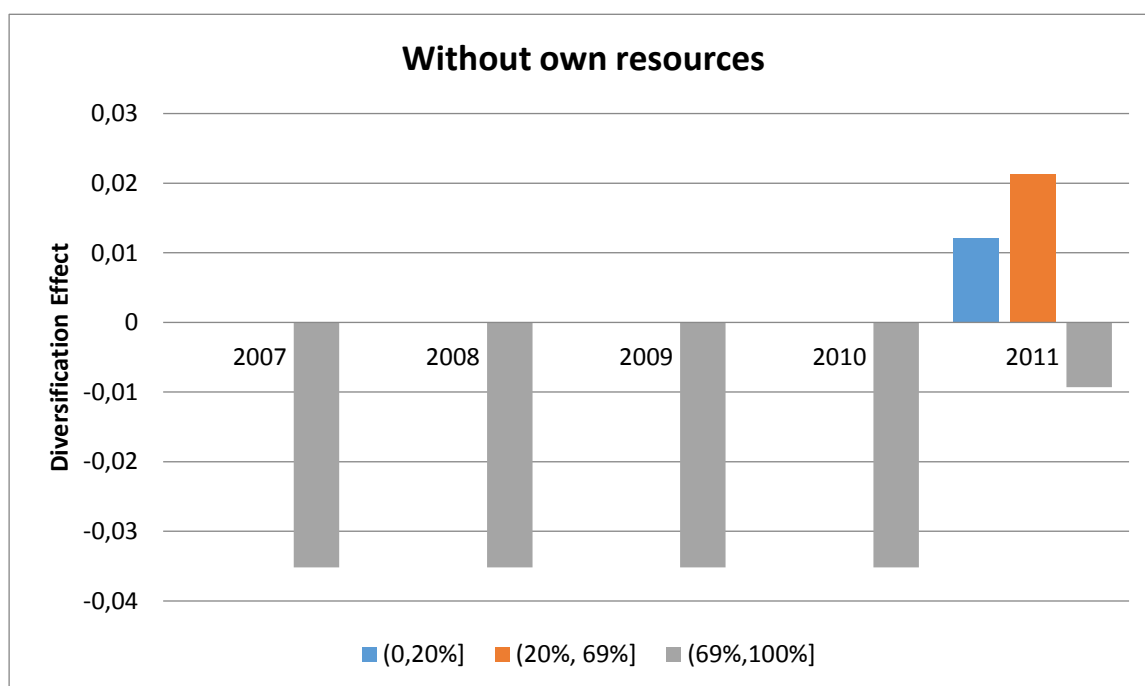
The coverage capacity generated through the internationalization degree and through the foreign entry mode can be observed in figures 13 and 14. In such a way, the results obtained for the whole sample are similar to the results obtained for firms exporting with own resources. However, when analyzing firms exporting without own resources it can be observed that the coverage effect needs additional time to capitalize. This results support hypothesis 4, which is the export mode effect.

Figure 13: Coverage as a result of diversification effect according to the entry mode (with own resources)



Source: Own elaboration based on table 11

Figure 14: Coverage as a result of diversification effect according to the entry mode (without own resources)



Source: Own elaboration based on table 11

As already shown, the interactions of the thresholds with the temporal variables allow to generate knowledge about the exporting activity as a natural coverage strategy prior to strategic risk. Thus, during the crisis years the effect of the exporting propensity on productivity growth is constrained by two factors. These are the entry mode or rather the commitment level of resources in internationalization process and the exporting propensity which cause a non-linear relation. Table 11 summarizes the obtained results. It can be observed that the interactions between the thresholds and the temporal variables are positive for the year 2011, regardless of the level of resource commitment. Moreover, the coefficients are similar for both entry modes. It can be also observed that a higher activity level implies a higher coverage coefficient. On the other hand, the interactions of 2010 are solely significant when firms export with own resources and the exporting propensity exceeds 21%.

Table 11: Summary of obtained results

	Export propensity		
	low	middle	high
Own resources	+ 2011	+2010 and 2011	+2010 and 2011
Without own resources	+ 2011	+2011	+2011

Source: Own elaboration

The exporting activity permits the reduction of a negative impact of a recession. Thus, it presents a risk coverage tool which verifies hypothesis 1 and corresponds with the obtained results (Lee and Makhija, 2009; Song et al., 2015). Furthermore, a higher resource commitment in the international activity improves the strategic risk coverage. Thus, it permits to accelerate or anticipate the attenuation of the negative effects that are accompanied by an economic crisis. Consequently, these results permit to contrast hypothesis 2.

4.4 Analysis of the diversification- and the operational flexibility effect

The model

The previously obtained results show that the geographic diversification permit to cover firm's strategic risk. However, the effects of flexibility options in export activity have not been controlled. Therefore, it exists the need to differentiate which part of coverage is caused solely due to exportation (diversification effect) and which part of coverage correspond to the decision and capacity to reduce and/or increase the export activity (operational flexibility effect). Consequently, to measure the operational flexibility effect, a variable is incorporated to the previous specification. The mentioned variable measures the realized changes in export activity which is exportation growth as a proxy of flexibility options execution $GEX_{i,t}$. Growth in exporting propensity was not used as a proxy of operational flexibility because it can be caused by both, real growth in exportation as well as reduction of domestic sales. The measurement of decisions that have been taken on export activity are consequently of interest. Thus, in the mentioned new specification, the export propensity reflects the static effect of geographic diversification and the growth in exportation the dynamic effect of operational flexibility.

The following specification of the model is proposed:

$$\begin{aligned}
GTFP_{i,t} = & \gamma_0 + \gamma_1 I(EL_{i,t} \leq th_1) + \gamma_2 I(th_1 < EL_{i,t} \leq th_2) + \gamma_3 I(th_2 < EL_{i,t}) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \beta_t Time_t + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{1t} (Time_t * I(EL_{i,t} \leq th_1)) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{2,t} (Time_t * I(th_1 < EL_{i,t} \leq th_2)) \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{3,t} (Time_t * I(th_2 < EL_{i,t})) + \gamma_3 GEX_{i,t} \\
& + \sum_{\substack{t=2007 \\ t \neq 2009}}^{2011} \alpha_{4,t} (Time_t * GEX_{i,t}) + \gamma_4 X_{i,t} + \lambda IMR_{i,t} + f_i \\
& + \varepsilon_{i,t}
\end{aligned} \tag{35}$$

where:

- $Performance_{i,t}$: as performance measures are used TFP growth, sales growth and ROA of firm i in time t ;
- $EL_{i,t}$: export intensity of firm i in time t ;
- $Time_t$: dummy variable that takes the value 1 in year t and 0 for the other years. The reference point of the impact is the most impacted crisis year in the production fabric of the Spanish economy (2009) whereby the two previous years 2007 (t-1) and 2008 (t-2), and subsequent years 2010 (t+1) and 2011 (t+2) are used;
- $I(\cdot)$: is a function that takes the value 1 if firm's export intensity i complies with the indicated inequalities in the moment t and 0 otherwise, th_k is the identified threshold;
- $GEX_{i,t}$: Exportation growth of firm i in time t ;
- $X_{i,t}$: set of control variables;
- $IMR_{i,t}$: Inverse of Mill's Ratio;
- f_i : firm fixed effects;
- $\varepsilon_{i,t}$: the error term.

Results

By including in the model the effect of real options, previous results are confirmed. Moreover, it modifies and extends significantly the obtained results.

The coefficients of the thresholds are not significant when using the whole sample. One exception is the case when firms have a high degree of internationalization. In this case, the coefficients are negative and significant. The interactions of the thresholds with temporal variables during the years prior to the crisis are not significant for any level of exporting propensity. In addition, exporting firms do not present any distinct performance in comparison to non-exporting firms during the years 2007, 2008 and 2009. However, firms with a high internationalization degree present a lower productivity growth in the same period. It is important to show that this result is maintained only for firms exporting without own resources. This result can occur due to the margin reduction which is accompanied by this type of strategy.

The coefficients of the interactions between the dummy variable of the year 2010 and the different internationalization levels are not significant. One exception is the intermediate internationalization level $[2010 * I(0.21 < EI_{i,t} \leq 0.69)]$. In this case, the coefficient is positive and significant. Furthermore, all identified coefficients for the year 2011 are positive and significant (See table 12).

The execution of flexibility options has been measured through exportation growth. The coefficients are significant and positive in all samples ($GEX_{i,t}$). For the whole sample, the interactions of the temporal effect with the effect of operative flexibility ($Time_t * GEX_{i,t}$) are significant and negative during the pre-crisis period (2007 and 2008). However, the coefficients are positive and significant for the year 2011.

The operative flexibility generated through the exporting activity affects positively the productivity. However, the effect is more intense during the crisis period in 2009 and 2010, and even more intense in 2011 (See table 12). The obtained results are similar for firms exporting without own resources. However, the coefficient for the interactions of the year 2011 is not significant for firms exporting with own resources (See table 12).

Table 12: Effects of exporting activity and operative flexibility on productivity growth during the economic crisis considering non-linear relations

	(1)	(2)	(3)
VARIABLES	All GTFP	OR GTFP	WOR GTFP
2007	-0.009***	-0.008**	-0.007**
<i>OLS</i>	(0.004)	(0.004)	(0.004)
<i>Jackknife</i>	(0.004)	(0.004)	(0.003)
<i>WBW</i>	0.000	0.016	0.027
2008	-0.006*	-0.005*	-0.006**
<i>OLS</i>	(0.003)	(0.004)	(0.003)
<i>Jackknife</i>	(0.003)	(0.003)	(0.002)
<i>WBW</i>	0.000	0.073	0.022
2010	-0.014***	-0.014***	-
<i>OLS</i>	(0.003)	(0.003)	0.013***
<i>Jackknife</i>	(0.003)	(0.003)	(0.003)
<i>WBW</i>	0.000	0.000	0.000
2011	-0.017***	-0.017***	-
<i>OLS</i>	(0.003)	(0.004)	0.016***
<i>Jackknife</i>	(0.003)	(0.004)	(0.003)
<i>WBW</i>	0.000	0.000	0.000
<i>Export Intensity</i>			
$I(EI_{i,t} \leq 0.21)$	0.001	0.003	0.001
<i>OLS</i>	(0.005)	(0.008)	(0.005)
<i>Jackknife</i>	(0.004)	(0.006)	(0.004)
<i>WBW</i>	0.856	0.867	0.764
$I(0.21 < EI_{i,t} \leq 0.69)$	-0.002	0.001	0.0003
<i>OLS</i>	(0.006)	(0.009)	(0.006)
<i>Jackknife</i>	(0.005)	(0.007)	(0.006)
<i>WBW</i>	0.617	0.983	0.944
$I(0.69 < EI_{i,t})$	-0.009*	0.003	-0.047**
<i>OLS</i>	(0.008)	(0.009)	(0.020)
<i>Jackknife</i>	(0.007)	(0.007)	(0.020)
<i>WBW</i>	0.090	0.663	0.051
<i>Year*Export Intensity</i>			
$2007 * I(EI_{i,t} \leq 0.21)$	0.002	0.001	0.002
<i>OLS</i>	(0.004)	(0.005)	(0.004)
<i>Jackknife</i>	(0.004)	(0.005)	(0.003)
<i>WBW</i>	0.416	0.837	0.285
$2008 * I(EI_{i,t} \leq 0.21)$	0.001	-0.000	0.002
<i>OLS</i>	(0.034)	(0.005)	(0.004)
<i>Jackknife</i>	(0.003)	(0.004)	(0.003)
<i>WBW</i>	0.724	0.764	0.420

	(1)	(2)	(3)
VARIABLES	All GTFP	OR GTFP	WOR GTFP
2010 * $I(EI_{i,t} \leq 0.21)$	0.004	0.004	0.028
<i>OLS</i>	(0.003)	(0.005)	(0.004)
<i>Jackknife</i>	(0.003)	(0.004)	(0.003)
<i>WBW</i>	0.252	0.209	0.362
2011 * $I(EI_{i,t} \leq 0.21)$	0.007*	0.005*	0.008**
<i>OLS</i>	(0.004)	(0.005)	(0.005)
<i>Jackknife</i>	(0.004)	(0.005)	(0.005)
<i>WBW</i>	0.057	0.093	0.036
2007 * $I(0.21 < EI_{i,t} \leq 0.69)$	0.001	0.004	-0.012
<i>OLS</i>	(0.005)	(0.005)	(0.009)
<i>Jackknife</i>	(0.004)	(0.005)	(0.008)
<i>WBW</i>	0.416	0.309	0.634
2008 * $I(0.21 < EI_{i,t} \leq 0.69)$	0.001	0.003	-0.007
<i>OLS</i>	(0.005)	(0.005)	(0.009)
<i>Jackknife</i>	(0.004)	(0.005)	(0.008)
<i>WBW</i>	0.724	0.462	0.439
2010 * $I(0.21 < EI_{i,t} \leq 0.69)$	0.011**	0.012**	0.006
<i>OLS</i>	(0.007)	(0.007)	(0.008)
<i>Jackknife</i>	(0.006)	(0.006)	(0.007)
<i>WBW</i>	0.021	0.022	0.110
2011 * $I(0.21 < EI_{i,t} \leq 0.69)$	0.009**	0.009**	0.011*
<i>OLS</i>	(0.004)	(0.006)	(0.006)
<i>Jackknife</i>	(0.003)	(0.005)	(0.005)
<i>WBW</i>	0.000	0.023	0.069
2007 * $I(0.69 < EI_{i,t})$	0.008	0.010	0.002
<i>OLS</i>	(0.013)	(0.013)	(0.023)
<i>Jackknife</i>	(0.012)	(0.013)	(0.021)
<i>WBW</i>	0.331	0.309	0.951
2008 * $I(0.69 < EI_{i,t})$	0.003	-0.001	0.019
<i>OLS</i>	(0.005)	(0.003)	(0.014)
<i>Jackknife</i>	(0.005)	(0.003)	(0.013)
<i>WBW</i>	0.442	0.608	0.223
2010 * $I(0.69 < EI_{i,t})$	0.010	0.007	0.021
<i>OLS</i>	(0.008)	(0.007)	(0.025)
<i>Jackknife</i>	(0.007)	(0.006)	(0.024)
<i>WBW</i>	0.205	0.490	0.160
2011 * $I(0.69 < EI_{i,t})$	0.018***	0.015**	0.033***
<i>OLS</i>	(0.006)	(0.007)	(0.012)
<i>Jackknife</i>	(0.006)	(0.006)	(0.011)
<i>WBW</i>	0.000	0.023	0.004
<i>Operational Flexibility</i>			
$GEX_{i,t}$	0.122***	0.123***	0.119***

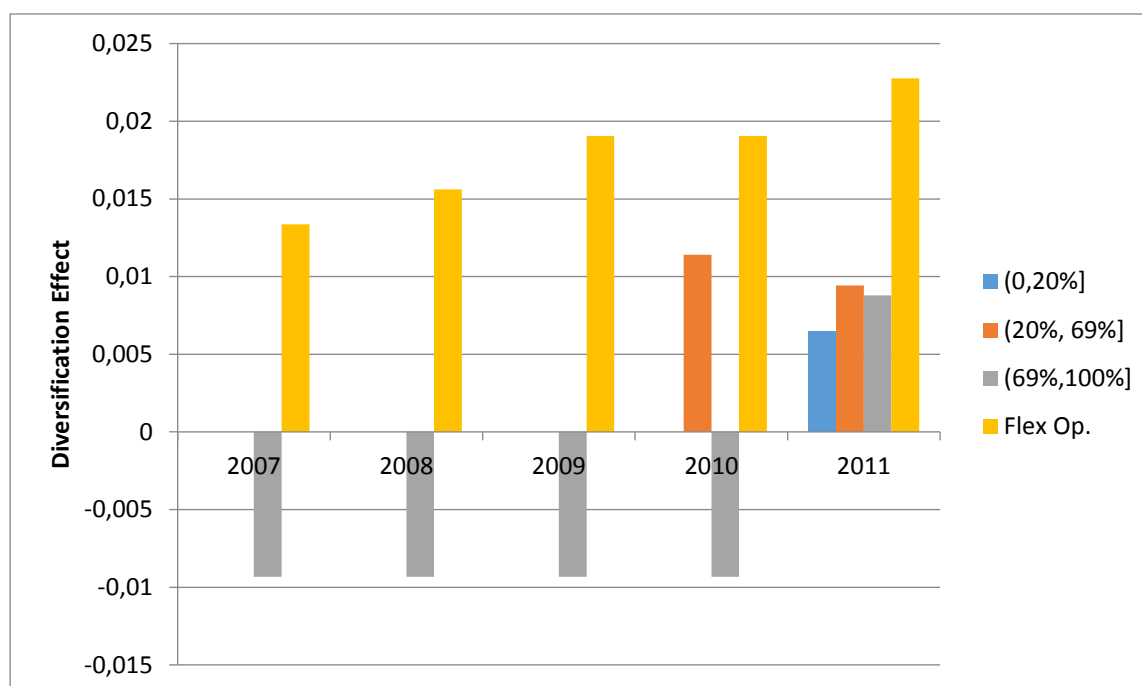
	(1)	(2)	(3)
VARIABLES	All GTFP	OR GTFP	WOR GTFP
<i>OLS</i>	(0.009)	(0.010)	(0.010)
<i>Jackknife</i>	(0.008)	(0.009)	(0.009)
<i>WBW</i>	0.000	0.000	0.000
<i>Year*Operational Flexibility</i>			
2007 * $GEX_{i,t}$	-0.036***	-0.042***	-0.034**
<i>OLS</i>	(0.012)	(0.015)	(0.014)
<i>Jackknife</i>	(0.011)	(0.014)	(0.012)
<i>WBW</i>	0.000	0.000	0.010
2008 * $GEX_{i,t}$	-0.022***	-0.015*	-
<i>OLS</i>	(0.012)	(0.010)	(0.013)
<i>Jackknife</i>	(0.010)	(0.009)	(0.013)
<i>WBW</i>	0.000	0.051	0.000
2010 * $GEX_{i,t}$	-0.002	-0.002	0.003
<i>OLS</i>	(0.009)	(0.009)	(0.011)
<i>Jackknife</i>	(0.010)	(0.010)	(0.009)
<i>WBW</i>	0.746	0.678	0.734
2011 * $GEX_{i,t}$	0.024**	0.021	0.024**
<i>OLS</i>	(0.013)	(0.014)	(0.017)
<i>Jackknife</i>	(0.011)	(0.013)	(0.015)
<i>WBW</i>	0.043	0.113	0.027
$TECDIS_{i,t-1}$	0.055***	0.037***	0.064***
<i>OLS</i>	(0.013)	(0.015)	(0.016)
<i>Jackknife</i>	(0.012)	(0.014)	(0.014)
<i>WBW</i>	0.000	0.000	0.000
$Size_{i,t}$	-0.001	-0.006	-0.005
<i>OLS</i>	(0.006)	(0.007)	(0.007)
<i>Jackknife</i>	(0.005)	(0.006)	(0.006)
<i>WBW</i>	0.777	0.253	0.256
$TFP_{i,t-2}$	-0.010***	-0.013***	-0.008**
<i>OLS</i>	(0.003)	(0.003)	(0.004)
<i>Jackknife</i>	(0.003)	(0.003)	(0.003)
<i>WBW</i>	0.000	0.000	0.026
$Pub_{i,t-2}$	0.001*	0.001**	0.001***
<i>OLS</i>	(0.001)	(0.001)	(0.001)
<i>Jackknife</i>	(0.005)	(0.001)	(0.001)
<i>WBW</i>	0.580	0.041	0.008
$IMR_{i,t}$	0.128***	0.092***	0.132***
<i>OLS</i>	(0.023)	(0.023)	(0.019)
<i>Jackknife</i>	(0.023)	(0.022)	(0.018)
<i>WBW</i>	0.000	0.000	0.000
Constant	-0.108***	-0.094**	0.164***

	(1)	(2)	(3)
	All	OR	WOR
VARIABLES	GTFP	GTFP	GTFP
OLS	(0.033)	(0.040)	(0.032)
Jackknife	(0.028)	(0.035)	(0.029)
th_1	0.21	0.21	0.21
th_2	0.69	0.69	0.69
Max VIF	6.42	6.23	5.99
Determinant Number	23.397	22.714	23.271
Observations	5,473	4,443	3,477
Firms	1,713	1,452	1,097
R-squared	0.804	0.808	0.809

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In figure 15 the effect of different internationalization levels as well as the effect of real options on productivity growth is presented. The effect of the internationalization degree differs in the pre-crisis period from the post-crisis period and depends furthermore on the exporting activity. The coverage capacity of firms with low and high internationalization level effects the firms two years after the crisis took place. Nevertheless, firms with an intermediate internationalization level improve their productivity already one year after the crisis had its highest impact. Thus, the degree of internationalization is able to characterize an adequate strategy of systematic risk coverage, which supports hypothesis 1. Furthermore, it exists an optimum degree of internationalization which determines the speed and the efficiency of coverage, which verifies partially hypothesis 2. Finally, a high degree of internationalization affects negatively firm's productivity in pre-crisis periods. The differentiation between entry modes permits to explain this result.

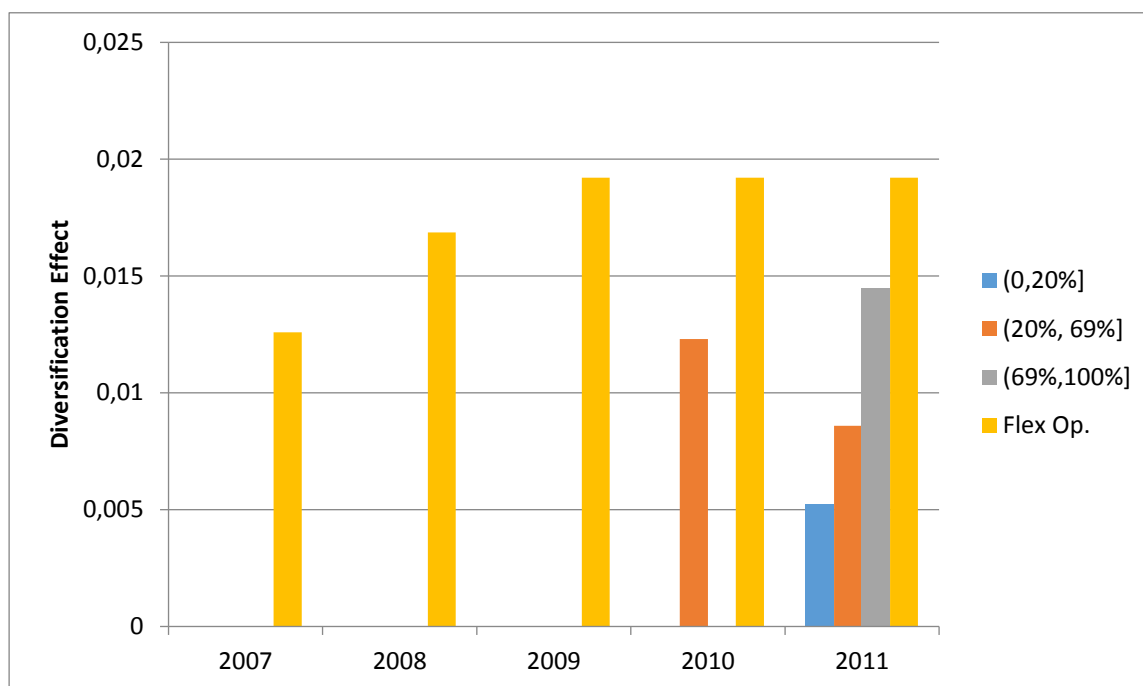
Figure 15: Coverage caused by the diversification- and the operative flexibility effect



Source: Own elaboration based on table 12

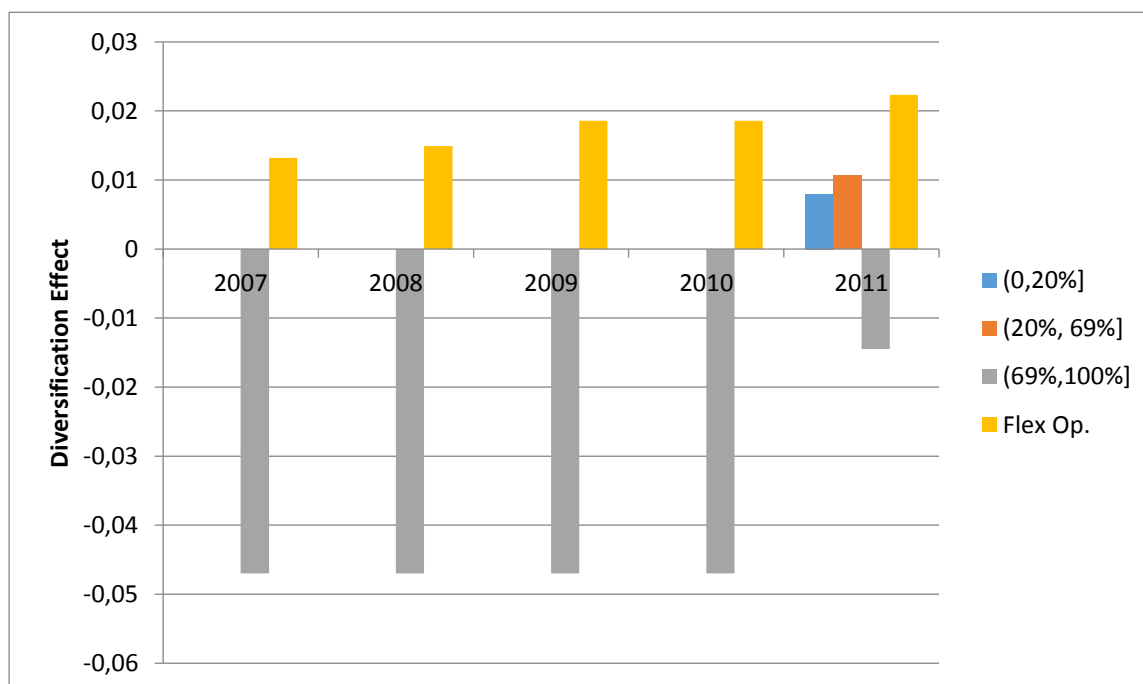
Figure 16 and 17 permit to compare the coverage quality in relation to the internationalization strategy, which allows for qualifying some previous statements. When firms present a high degree of internationalization and export without own resources, the productivity is reduced during the pre-crisis period. Furthermore, the coverage effect which is observed one year after the crisis, by firms with an intermediate internationalization degree, can be only generated by firms exporting without own resources. Likewise, the execution of flexibility options has a similar effect in both internationalization strategies. One exception is when two years passes after the crisis and the firm export without own resources. In this case, the increase in export activity leads to a higher growth in productivity. These results allow to confirm partially hypothesis 4.

Figure 16: Coverage caused by the diversification- and the operative flexibility effect (with own resources)



Source: Own elaboration based on table 12

Figure 17: Coverage caused by the diversification- and the operative flexibility effect (without own resources)



Source: Own elaboration based on table 12

5 Conclusions and direction for further research

The final chapter 5 contains the conclusions regarding the research question. The results within the present work indicate that internationalization permits the mitigation of the negative effects of a significant change within firm's environment. This conclusion confirms that internationalization reduces the risk, or in detail that export activity reduces SMEs risk. Likewise, an analysis was performed to clarify, which variables increase the effect that the internationalization has on risk. Regarding to this, the results can have different implications and results, which are presented below. As in the present work remain questions regarding the internationalization and risk relationship, section 5.1 subsequently discusses the limitations and presents directions for further research regarding this issue.

5.1 Conclusions

The empirical work makes several contributions regarding the existent relation between internationalization and risk. Previous studies from several different perspectives have underlined the importance of internationalization in international business literature and how they might influence firm's performance and risk. By widening markets and creating room for expansion, exporting to foreign markets is considered an essential path for firm growth. The potential economic benefits from exporting, together with the stepping-stone effect for future international expansion, suggest that the extent of exporting should positively influence firm's performance and risk. On the other hand, exportation does not only have advantages. Disadvantages exist, as well. The fact of existent benefits as well as costs is an indication that negative relationships can occur. This happens, when the costs exceed the benefits. Consequently, non-linear relations can occur between firm's internationalization and performance. To control for non-linearity, a threshold regression approach is used which allows to identify different levels of export propensity which cause a change in firm's performance. In this regard, three different thresholds are identified. Consequently, the internationalization and risk relationship is dissimilar for Spanish firms that demonstrate an internationalization level up to 21%, between 21% and 69% and more than 69%.

Evidence exist already regarding the relation between internationalization and performance. In this regard, primarily MNEs where used in literature, but evidence also exist by using

SMEs. However, the evidence that relates internationalization and risk is rare and present important limitations. One main problem is the definition and measure of risk. Firm's risk is defined by Hsieh et al. (2010) as instabilities and vulnerabilities of firms that engaged in internationalization and which impose limitations, restrictions and/or losses. In this regard, the definition and measure of risk has presented a limitation in previous research, especially by using SMEs. This work has circumvented the risk definition by applying a quasi-experiment. It is consequently a contribution to literature because the present work analyses the risk reduction capacity in internationalization, by using SMEs.

In addition, further related issues have also received less attention. The analysis of real options in internationalization decisions, which generate operative flexibility, has been analyzed less. But, especially this analytical methodology solves existing problems of e.g. measurement and contributes new evidence to literature.

Based on the existent gaps in the literature, this doctoral thesis has focused to analyze and detect specific factors that determine the relation between exportation and risk for SMEs. The study makes consequently a contribution to literature by analyzing these issues and filling some important gaps.

In the conceptual framework, the recent global financial crisis was used as a natural experiment for the research to study the mentioned impact in time of economic turbulences. In detail, the present work has analyzed how the economic crisis is challenging internationalization strategies of Spanish firms and how this inversion in internationalization decreases firm's risk during the economic and financial European crisis between 2007-2011. Since Spanish firms have been severely affected by the economic crisis, they are the ideal example for this work. Furthermore, the export mode is a significant factor in the exporting-risk relationship. It is the resource commitment in exporting which enables the firm with the capacity of knowledge generation. The selection of the accurate export mode is consequently related with a significant impact on performance and risk and it is furthermore related to the first three hypotheses.

Four hypotheses are placed and analyzed in the present work. The first hypothesis claims that internationalization reduces firm's risk. It is named in the work as the export effect. The results indicate that during the period between 2007 and 2011, non-exporting SMEs experienced a higher productivity loss than exporting SMEs. The empirical findings confirm consequently the claimed hypothesis and support the central thesis that the internationalization

through the export activity reduces firm's risk. Especially in crisis periods, exporting firms are enabled with a better performance and higher risk reduction capacity than non-exporting firms. This is the first confirmed hypothesis and the effect is named as the export effect. Thus, the negative effect of the crisis on performance has a lower intensity on exporting firms than on domestic firms. This result validates hypothesis 1.

After the conclusion that the export activity is enabled with the capacity to reduce firm's risk, in a further step the reasons for this relationship have been clarified. First, it was presumed that the export diversity influences the mentioned relationship. Thus, hypothesis 2 claims that the export diversification reduces strategic risk. This means that a higher international diversity increases the performance and reduces the risk, which is named as the diversification effect. This hypothesis is analyzed by implanting a threshold model. The threshold regression has examined the performance and risk in relation to different levels of geographic diversification, to control for non-linear relations. The result is that the internationalization-risk relationship for Spanish firms changes at different ratios of firm's sales abroad. Thus, different thresholds are identified at the 0.21 and the 0.69 level. This means that the internationalization-risk relationship is dissimilar for Spanish firms having up to 21 % of their sales abroad in contrast to Spanish firm presenting sales between 21 % and 69 % and firms having more than 69 % of their sales abroad. Consequently, the firm should present a minimum export level of 21 % or rather more than 69 % of their outcome to benefit more from the export activity. When exporting less than 21% of firm's total outcome, firms do not present positive effects. One explanation for the delayed capitalization is the learning through exporting hypothesis. It is proposed that exporting contributes indirectly to firm growth and to firm profitability by providing firms with opportunities to generate and develop new knowledge about various markets (Lu and Beamish, 2006). Barkema and Vermeulen (1998) claim that firms learn how to manage international operations with the progress of time. The hypothesis of learning-by-exporting proposes an improvement of productivity because of the knowledge, generated by the mentioned activity. The results indicate that a certain level of export has to be reached to benefit from the learning effects. It is consequently proved that the diversification effect is one explanation for the export effect. Thus, firm's performance and risk depend on the diversification level, which confirms hypothesis 2. The difference to the first hypothesis is the amount of exportation. In hypothesis 1 was clarified that the exporting activity in general reduces the risk. Hypothesis 2 extends the result from hypothesis 1 and shows that this result

depends on the amount of exportation. Thus, not for each firm's exporting degree a risk coverage does exist.

A further explanation or reason for the export effect is based on the real options effect. It was claimed that firms are able to circumvent lower performance in crisis periods when using real options in form of higher flexibility through internationalization. Thus, internationalization should provide exporting firms with a coverage option and higher flexibility in crisis periods by switching sales to new markets and/or increasing or reducing sales in several markets. The real option effect should consequently allow firms to maintain high sales in times of unanticipated economic crisis. In order to measure the operational flexibility, the variable $GEX_{i,t}$ has been added to the model which measures the exportation growth as a proxy of flexibility options. The mentioned variable suggests that the operational flexibility generated through the export activity reduces significantly the strategic risk in all cases. Consequently, operative flexibility reduces the risk before and after the crisis as well as for firms exporting with and without own resources. However, the mentioned effect is more intense when observing the crisis period in 2009 and 2010, and even more intense in the year 2011. Thus, hypothesis 3 can be confirmed. Furthermore, for the whole sample, the interactions of the temporal effect with the effect of operative flexibility ($Time_t * GEX_{i,t}$) are significant and negative during the years prior to the crisis. Foremost in 2011 the effect turns into significant and positive. This result is peculiar but confirms again hypothesis of learning by exporting.

After clarifying the third hypothesis, hypothesis 4 was analyzed, which demonstrates the export mode effect. In this regard, the export mode is defined by Rasheed (2005) as an institutional arrangement which allows firms to use their products or services in a foreign country or an institutional arrangement that enables the entry of firm's products or other resources into a foreign country. Indirect export methods require less resources compromise while direct export methods require more. This is important because resource commitment in exporting activity generates foreign knowledge, which in turn has the capacity to reduce firm's risk. To analyze the mentioned hypothesis, in each model the sample is separated into firms exporting with and firms exporting without own resources. Thus, every model has to be observed depending on the export mode.

When observing the results for the first model by separating the firms by their export mode, it can be observed that the positive effect in 2011 is relatively similar between firms exporting

with and without own resources. Nevertheless, during the year 2010 the coefficient of firms exporting with own resources is nearly double as of firms exporting without own resources. These results are the first conclusion that support hypothesis 4.

The second model where the export propensity is included also makes contribution to hypothesis 4. In detail, the export propensity turns into statistically significant, only by incorporating firms export without own resources. In this case, the effect is negative and significant. This signifies that firms exporting without own resources present a smaller productivity growth in comparison to non-exporting firms during the year 2009. This did not occur when firms export with own resources, which also supports hypothesis 4. Furthermore, when observing the diversification effect of firms with and without own resources is in the crisis years, it can be observed that firms which export with own resources are enabled with a better coverage mechanism than firms which export without own resources. This result also permits to confirm hypothesis 4. Thus, the commitment in internationalization resources improves the coverage effect gained through the geographic diversification.

The third model also makes significant contribution to hypothesis 4. In this regard, the coverage capacity generated through the internationalization degree and through the foreign entry mode can be observed. It can be observed that the coverage effect needs additional time to capitalize for firms without own resources. This results support hypothesis 4. Furthermore, the interactions of the thresholds with the temporal variables allow to generate knowledge about the exporting activity as a natural coverage strategy prior to strategic risk.

Thus, during the crisis years the effect of the exporting propensity on productivity growth is constrained by the commitment level of resources in the process of internationalization. It can be furthermore observed that the interactions between the thresholds and the temporal variables are positive for the year 2011 and the coefficients are similar for both entry modes. On the other hand, the interactions of 2010 are significant, only when firms export with own resources and the exporting propensity exceeds 21%, which also supports hypothesis 4.

The fourth model gives also some clarification regarding the fourth hypothesis. Thus, for firms exporting without own resources and having a high degree of export, the result remains for every year significant and negative. When the same firms export with own resources, the results are no longer significant. One exception is the year 2011. The result turns then into significant and positive. This result can be explained because firms exporting without own resources have a smaller margin than firms exporting with own resources. Consequently, firms exporting with own resources can benefit at an earlier stage of time than firms exporting without own resources.

The presented results consequently support hypothesis 4, which has a significant contribution to literature because previous literature related to entry mode choice primarily concerns MNEs. The analysis of SMEs, which in general belong to export, have been analyzed less. The results support the hypothesis of firm's strategic risk reduction through resource commitment in export activity. Firms exporting with own resources are endowed with the potential to further reduce the risk in comparison to firms exporting without own resources.

To sum up, the results of existing research have been inconclusive and research including the export-risk relationship of SMEs during the European economic crisis is rare or do not exist. The present research fills consequently a gap in the existing literature on the topic of internationalization-performance analysis. As a result, the empirical findings confirm the claimed hypotheses and support the central thesis that internationalization through export activity reduces firm's risk. To sum up, in crisis periods, exporting firms are enabled with better performance than non-exporting firms.

The results obtained in the thesis are applicable in practice. Thus, it has significant strategic implications for domestic firms. It is therefore recommended that domestic firms should export to increase their performance and to reduce risk. However, differences exist. Even though, export activity increases the performance in general, conditions exist to maximize this positive effect. First, the firm should export with own resources. In this way, the firm is more flexible and collects more knowledge. The export propensity is also important. The firm should export at least 21 % of their outcome or rather more than 69 % of their outcome. Firms that comply with these conditions are even more capable of capitalizing on the positive effects that come from export activity.

As previous researches present inconclusive results regarding the research question, the present work gives a tendency and determines some dependent factors that influence the results. This clarification and determination of the mentioned dependent factors makes a significant contribution to current science and practice and serves as a base to modify previous results in this field of literature and to provide recommendations for firms in practice.

5.2 Limitations and directions for further research

As in other studies, the current study is also subject to certain limitations. First, the research is limited because productivity was used to measure firm's performance. The term of "firm-performance" is extensively distinct in contrast to the internationalization concept. In this regard, productivity is only one of numerous possible idiosyncratic factors that determines profits. Other performance measurement variables should be used as well, to verify the results. In line with an empirical study that examines the relationship between internationalization and firm-performance, the choice of an appropriate measurement of performance is not unproblematic, because the disposability of required data could represent a restriction for the practicability of a performance-measure. However, traditional profitability measurements have been applied in the present research. Different researchers classify performance measurements by differentiating between market-based measures and accounting-based measures. Accounting-based measures are generally calculated on a firm's balance sheet, profit-and loss account, cash flow statement and income statement. Market-based measurements use capital market data and stock price valuations (Coenenberg, 2003). The performance measurements in this work have already been explained broadly. However, different accounting-based measurements were also applied but not incorporated in this work. These are ROA, ROS and Growth in sales. Due to the fact that no satisfactory results were generated by using these measurements, the measurements have not been included in the empirical work. Consequently, productivity is considered in this work as a better measurement of firm performance than accounting-based measurements. In literature, different reasons exist that confirm this statement. Miller et al. (2007) claim that accounting based measurements may be subject to manipulation by management. A further limitation of accounting-based measurements is that they provide only a short-run perspective because they are based on past or present values. Productivity is in turn able to provide a long-run perspective because this measurement con-

siders future-oriented aspects. Consequently, productivity allows for the assessment of such efficiency-based differences among firms, which is in line with the theoretical reasoning of this work. The results with the performance measures ROA, ROS and Growth in sales are consequently reasonably excluded from this work. However, the work is limited by solely productivity as performance measurement. Further work could also introduce additional market-based measures to validate the obtained results.

Moreover, not only the dependent variable should be extended, but also the independent. By using other or additional internationalization measurement variables the results could change. The used data base has not allowed more sophisticated measurements of the diversification level. Thus, to validate the obtained results and deepen the knowledge in the mentioned area, additional variables should be added or replaced. When using further data bases, more sophisticated measurements could be possible.

Furthermore, export activity should be differentiated to a higher extent. The present work only distinguishes the degree of internationalization or rather the percentage of exportation of firm's overall output. The work consequently does not distinguish where the firm exports to or the number of different countries. The conception of psychological distance should be incorporated, as well. This is the sum of factors preventing the flow of information from and to the exporting markets which are differences such as language, culture, business practices, politics, levels of education and industrial development.

A further limitation is that the hypotheses are tested by using Spanish manufacturing firms in a specific period of crisis (2007-2011). The financial, economic and sovereign debt crises may influence the strategies taken by Spanish firms, because Spain was one of the countries most affected by the crisis. Other crises or firms in other countries in the current crisis could have different results. Thus, opportunities for future research also exist by studying the research questions with firms based in other countries and affected by other crises. It would be interesting to reproduce this research with data for other periods of time. To this end, it could be tested if the obtained results occur only because of a period of crisis, or if the obtained results hold also in periods without an economic downturn. It would also be interesting to reproduce this research with data for other periods. Thus, the validity of the obtained results would be strengthened when other researchers using dissimilar data but the same methodology obtain the same results.

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